The Research Quarterly

of the American Association for Health, Physical Education, and Recreation

MARY WIBEL, *Acting Editor*

VOLUME 15 — MAY, 1944 — NUMBER 2

Contents

	Page
A Study of Circulatory-Respiratory Changes as Indicated by the McCurdy-Larson Organic Efficiency Test in Relation to Physiological Age. *C. Wesley Dane*	98
Physiological Maturity as a Factor in the Qualification of Boys for Physical Activity. *Anna Espenschade*	113
A Study of the Health Practices, Knowledge, Attitudes, and Interests of Senior High School Pupils. *Warren H. Southworth, Jean V. Latimer, and Clair E. Turner*	116
The Measurement of Capacities for Learning Dance Movement Techniques. *Rachel Jane Benton*	137
An Assessment of the Validity of Height-Weight Class Divisions for High School Girls. *Karl W. Bookwalter*	145
Guide for Tracing Research in the Health, Physical Education, and Recreation Field. *Thomas K. Cureton*	150
The Value of the Motion Picture as an Instructional Device in Learning a Motor Skill. *Aileene Lockhart*	181
What the Public Knows About Nutrition. *H. F. Kilander*	188
Research Abstracts. National Council of the Research Section	198
Life and Honorary Members	204
State and Section Representatives	205
Reprints from Past Issues of the Quarterly	206

BOARD OF ASSOCIATE EDITORS

Dorothy Ainsworth
V. S. Blanchard
John Bovard
D. K. Brace
C. L. Brownell
Frederick Cozens
A. Lester Crapser
T. K. Cureton
Leslie W. Irwin
Peter V. Karpovich
C. V. Langton
William R. LaPorte
Leonard A. Larson
Frank S. Lloyd
C. H. McCloy
C. M. Miles
Gertrude E. Moulton
Jay B. Nash
D. Oberteuffer
W. W. Patty
Harry A. Scott
J. R. Sharman
G. T. Stafford
A. H Steinhaus
Alden W. Thompson
W. W. Tuttle
Jesse F. Williams

Published in March, May, October, and December by the American Association for Health, Physical Education, and Recreation, 1201 Sixteenth Street, N.W., Washington 6, D. C. Subscription, $3.00 per year; single copies, $1.00.

Send subscription to: 1201 Sixteenth Street, N.W., Washington 6, D. C.

Editorial and Advertising Office: 1201 Sixteenth Street, N.W., Washington, D. C. Advertising rates on application.

Entered as second-class matter at the Post Office at Washington, D. C., under the act of March 3, 1879.

A Study of Circulatory-Respiratory Changes As Indicated by the McCurdy-Larson Organic Efficiency Test In Relation to Physiological Age

By C. Wesley Dane
Indiana University
Bloomington, Indiana

INTRODUCTION

THE earliest tests and measurements in physical education were limited to measurements of body size. The objective was to determine from a standpoint of beauty and symmetry the muscular proportions of the ideal man. It was natural that an interest should spread from muscular size to muscular ability, and here we have the beginning of tests of body function.

Sargent's "Test of Man," developed in 1880 for the purpose of indicating the physical capacity of Harvard men for physical activities, was the first recognized test of strength. Interest in strength testing declined until 1925 when there was a revival as a result of the work done by F. R. Rogers.[1] His results showed a significant correlation between strength and athletic ability which could be used in classifying pupils in physical education.

Soon after 1890, however, rapid advances were made in the physiology of the heart and circulation with a new emphasis placed on the hygienic rather than the muscular aspects of man.[2] Out of this increased knowledge and closely associated with it there developed a series of cardiovascular tests.

The test which seems to meet most satisfactorily the criteria for test construction and appears to be the most valid, when studied statistically, is the McCurdy-Larson Organic Efficiency Test[3] which is based on five organic functional (circulatory-respiratory) measures. The work of McCurdy and Larson gives us norms for males ranging in age from eighty-four to eighteen, and an experiment

---

* This study is taken from an unpublished master's thesis of the same title written at Springfield College, Springfield, Massachusetts, August, 1941.

1 F. R. Rogers, *Physical Capacity Tests in the Administration of Physical Education*. (New York: Teachers College Contribution to Education, Columbia University, 1926). 173, p. 93.

2 John F. Bovard and Frederick W. Cozens, *Tests and Measurements in Physical Education*, Third Edition. (Philadelphia: W. B. Saunders Company, 1938), p. 35.

3 James H. McCurdy and Leonard A. Larson, *The Physiology of Exercise*, (Philadelphia: Lea & Febiger, 1939), p. 315 ff.

Medical
Direct
4-5-4 b
Shortage
(v. 15, no. 2)

by Willard J. Ferguson[4] extends this to include boys from age seventeen and a half to thirteen and a half.

Although the present study is with boys of the same age as those used by Ferguson, it considers physiological age rather than chronological age as a discriminatory characteristic. Varying degrees of function are determined by comparing the results obtained by the test with the proper physiological age norms.

PROBLEM

The Purpose

The purpose of this study is: first, to determine within the physiological age groupings of boys whether there are changes in the various circulatory-respiratory items; second, if changes are found, to determine whether these are significant; and third, if they *are* significant, to set up age norms and classification tables for boys according to each of the physiological ages.

The Limitations

This study is limited to junior high school and high school boys classified into pre-pubescent, pubescent, and post-pubescent periods. This includes a chronological age range of ten and one-half to seventeen and one-half years.

The second limitation is that of the pubic-hair criterion. This method of classification is subjective, yet there seems to be sufficient evidence in the field to warrant its use as being the best method available.

The third limitation is that only the circulatory-respiratory items directly or indirectly related to the McCurdy-Larson Organic Efficiency Test are considered.

THE McCURDY-LARSON ORGANIC EFFICIENCY TEST

Description of the Test

The McCurdy-Larson Organic Efficiency Test[5] is based on five organic functional (circulatory-respiratory) measures. These items are sitting diastolic blood pressure, breath-holding twenty seconds after a standard stair-climbing exercise, difference between standing normal pulse rate and pulse rate two minutes after exercise, standing pulse pressure, and vital capacity. These five items were selected from a list of twenty-six circulatory and respiratory measures as being the most significant. The multiple correlation of these five items with condition as expressed by two typical groups, "Good" and "Poor," was 0.947.

The equipment necessary to administer this test is a sphgmomanometer and a stethoscope for taking blood pressure, a split-second

[4] Willard J. Ferguson, *A Normative Study of the McCurdy-Larson Organic Efficiency Test for Adolescent Boys*, Unpublished master's thesis, Springfield College, July, 1939.

[5] McCurdy and Larson, *op. cit.*, p. 315 ff.

or double-action stop watch for timing heart rate, a flarimeter for the determining of breath-holding ability and vital capacity, and the regulation stairs as used by the Prudential Life Insurance Company of America. There should also be a bottle of alcohol in which to sterilize the mouthpiece of the flarimeter after each usage and a glass of water for rinsing.

Application and Limitations

There are four major respects in which this test is applicable to the field of physical education:

1. In conjunction with the medical examination to determine the physiological fitness for physical education activities.
2. In measuring improvement in physiological fitness in individuals taking part in a physical education program.
3. In showing return to normal after temporary illness.
4. In classifying athletes who have learned the skills in which they are graded in physiological fitness.[6]

However, there are certain limitations of which the physical educator must be cognizant;

1. In predicting success in athletes unless all elements making for success are either controlled or measured and factored out of the problem.
2. In place of the medical examination as it does not indicate structural defects which are compensated.
3. In place of an anthropometric, strength, or motor and athletic ability tests. It does not measure, at least adequately, body build, body strength, or ability to handle body in general athletic movements.[7]

Validity of the Organic Efficiency Test

The presence of many tests in the field, all purporting to measure the same characteristic, *viz.*, functional efficiency of the circulatory-respiratory systems, gave rise to certain questions regarding the relationship between the tests. Are they specific tests, or do they all give information as to the general body fitness?

In an effort to answer this problem Larson completed a study, the purpose of which was,

(1) to determine the consistency between cardio-vascular tests in grading physiological efficiency, (2) to determine the significance of the various selected items including the physiological changes as the result of training or illness, (3) to determine the validity of the eleven tests, and (4) to combine significant test items into the best battery as an indicator of physiological efficiency.[8]

Among his conclusions[9] after a careful study of the eleven best tests in the field are the following: (1) The tests do not consistently classify the pupils according to functional efficiency. Only the McCurdy-Larson Organic Efficiency Test reached the .80 standard for test validity. (2) The McCurdy-Larson Efficiency Test is the most

6 McCurdy and Larson, *op. cit.*, p. 319.
7 *Ibid.*
8 Leonard A. Larson, "A Study of the Validity of Some Cardio-Vascular Tests," *The Journal of Experimental Education*, VIII (March, 1939), p. 214.
9 *Ibid.*, p. 218.

significant in indicating the physiological changes due to training and to illness. (3) The McCurdy-Larson Organic Efficiency Test is the most valid test of cardio-vascular efficiency according to selected criteria. (4) The "Short Organic Efficiency Test"[10] has a higher degree of validity than any of the tests in the study except that of the McCurdy-Larson Organic Efficiency Test.

Reliability of Test Items

Larson[11] conducted an experiment using twenty-one subjects in which he showed that there was a significant degree of consistency in the measurement of physiological functions.

> These correlations ranged from 0.7428 for breath-holding after exercise to 0.9740 for vital capacity. The items used were: pulse rate, systolic pressure, diastolic pressure, pulse pressure, vital capacity, breath-holding after exercise, and difference between standing normal pulse-rate and pulse rate two minutes after exercise.

Two experiments were conducted at Springfield College to establish the objectivity of measurements. With experienced examiners, correlations ranged from 0.77 for diastolic pressure to 0.91 for systolic pressure, denoting a significant degree of consistency. With trained but inexperienced student examiners, correlations ranged from 0.4150 to 0.8812.[12]

Using twenty Springfield College students picked at random, Ferguson[13] found his reading yielded the following reliabilities: sitting diastolic pressure, .963; breath-holding twenty seconds after exercise, .982; standing normal pulse rate minus pulse rate two minutes after exercise, .670; standing pulse pressure, .975; vital capacity, .956; Organic Efficiency Test Index Score, .914.

> In conclusion it may be said that physiological functions may be measured with a significant degree of consistency, with experienced examiners, to render function useful in experimentation . . . It is desirable, when applying cardiovascular tests, to repeat the test three times using mean score as the index score. This procedure will increase the reliability to a high enough degree to render the test useful for individual diagnosis.[14]

PROCEDURE

Determination of Physiological Age

A *pubescent* is an individual who is undergoing this process of becoming covered with hair and is in the period of pubescence. The period of pre-pubescence begins at birth and ends at the beginning of pubescence and all in this period are pre-pubescents. The transition from the pre-pubescent stage to the post-pubescent stage is gradual. It is begun by an evident and rapid growth of the fine hair apparently already present. This is readily distinguishable, and this characteristic marks the first part of the period of pubescence; the second period of pubescence commences with the pigmentation of this ex-

10 *Loc. Cit.*
11 McCurdy and Larson, *op. cit.*, p. 303.
12 *Ibid.*, pp. 303-304.
13 Ferguson, *op. cit.*
14 McCurdy and Larson, *op. cit.*, p. 304.

aggerated growth and pubescence arbitrarily ends with the appearance of the kink or twist which is definitely characteristic.[15]

Dr. McCurdy accepted this classification by Crampton in his master's thesis[16] but he qualified the characteristics somewhat after the suggestions by Godin.[17] Dr. McCurdy's criteria are as follows[18]:

1	No hair.	
1+	Very fine growth of hair, unpigmented.	Pre-Pubescent P_1
2	Increase in amount of hair. Hair straight, pigmented.	Pubescent P_2
2+	Still greater amount of hair.	
—3	Pubic region covered with a mat of hair. Kinked and pigmented. Boyish features.	
3	Corrugations deepen on scrotum. Mature face. A pre-pubescent has flesh of a tallowy feeling and his cheeks are rounded. The post-pubescent seems dried out.	Post-Pubescent P_3

Many tests and studies have been conducted at Springfield College using the pubic-hair criterion for judging pubescence or physiological age.[19, 20, 21, 22] The consensus of opinion seems to be that while there are other methods of classification the one easiest to administer and having the greatest amount of reliability and validity is that initiated by Crampton; it is this mehod which was used in this study.

Administration of the Test

All tests were conducted in the Classical High School, Buckingham Junior High School, and Forest Park Junior High School of Springfield, Massachusetts. The examinations were conducted in rooms somewhat removed from the gymnasia in order to have the conditions as quiet as possible.

All tests were conducted in the morning to eliminate any changes in cardio-vascular functioning, which would be reflected in the items being measured, due to the eating of the noon meal or due to fatigue.

---

15 C. Ward Crampton, "Physiological Age—A Fundamental Principle," *The American Physical Education Review*, XIII (March-June, 1908), p. 3.

16 James H. McCurdy, "Adolescent Changes in Heart Rate and Blood Pressure, Reprinted from *American Physical Education Review* (June, 1910), p. 2.

17 Paul Godin, *Growth During School Age*, Translated by Samuel L. Eby (Boston: Richard G. Badger, 1920), 268 pp.

18 John D. Brock, Summarized by, "Heart Rate in Relation to Adolescence," (unpublished thesis, Springfield College, 1910), pp. 5-6.

19 Emil A. Hulek, "Heart Rate of Adolescent Boys," (unpublished thesis, Springfield College, 1911).

20 Lester P. Dittmore, "Blood Pressure in Relation to Pubescence," (unpublished thesis, Springfield College, 1912).

21 Paul B. Samson, "Heart Rate and Blood Pressure in Relation to Pubescence," (unpublished thesis, Springfield College, 1912).

22 Wilbur D. West, "A Study of Physical Condition of Adolescent Boys in Relation to Heart Rate, Blood Pressure, and Pubescence," (unpublished thesis, Springfield College, June, 1929).

The following is a list of causes for which boys were eliminated from the examination:

1. Physical exercise during that day.
2. Loss of sleep the night before.
3. Cold, sore throat, cough, toothache, headache, or infections.
4. Stomach upsets.
5. Fatigue.
6. Excitement for any reason.
7. Nervousness (usually related to the examination).
9. Mental anxiety.
9. Doubtful physiological age.

In the administration of the McCurdy-Larson Organic Efficiency Test, the procedure was as follows:

1. Record name, age, weight, height, date, and hour of the examination.

2. Secure sitting systolic and diastolic (fourth phase) blood pressure. Allow rest before first reading.

3. Standing systolic and diastolic (fourth phase) blood pressure. Allow at least one-minute rest (standing) before measurement.

4. Determine vital capacity in cc. by using flarimeter. (Large orifice). Give two trials. Record also the temperature reading.

5. Standing normal pulse rate. Take two 15-second readings; if alike, take a third reading and multiply by four.

6. Determine the number of stair ascents according to age and weight (Master-Oppenheimer Table).

7. Give a trial blow on flarimeter using small orifice.

8. Stair-climbing exercise. Count for subject to insure completing of exercise in exactly 90 seconds. Following exercise, subject sits and rests.

9. Breath-holding begins at just 20 seconds after exercise. (Use flarimeter, small orifice). The blow should be preceded by one large inhalation.

10. Pulse rate two minutes after exercise. The subject should remain seated and resting until one minute and forty-five seconds after exercise and then stand. Pulse count should begin two minutes after exercise. It should be for a fifteen-second interval and multiplied by four.[23]

Organization and Statistical Method

Although every effort was made to examine only boys who were *normal* at the time of the examination and to eliminate any factors which might condition the functional responses of those examined, data presumed to reflect a temporary situation were discarded on the following basis:

[23] For a detailed account of the manner in which to operate a split-second stop-watch in securing these data, see the original thesis, page 31.

1. Standing normal pulse rate more than 100 beats per minute.
2. Systolic blood pressure more than 140 mm Hg.
3. Diastolic blood pressure more than 100 mm Hg.
4. Pulse pressure more than 70 mm Hg.
5. Difference in normal standing pulse rate and pulse rate two minutes after exercise more than ± 24.
6. Difference between the two normal standing pulse rates of more than eight beats per minute.

Twenty-one cardiovascular items were then selected, and each of the physiological age groups was analyzed item for item in respect to each of the other physiological age groups. The statistical techniques used were those which express the significance of difference among groups. These are the mean with the standard error, the difference of the means with the standard error of the difference, the critical ratio, and the bi-serial correlation.

Norming the Test

It having been determined that there are statistically significant differences among the three physiological age groups, it will be necessary to construct scoring tables for each group. This is accomplished by using the same method as McCurdy and Larson used in their Organic Efficiency Test.[24]

The raw score (blood pressure reading, vital capacity, etc.) is changed to a Z-Score and the Z-Score to another form of standard score which is weighted for variability. It is assumed that the weighting of the items is the same as in the college age group.

$$\text{Z-score} = \frac{x - m}{\text{sigma}} \qquad \text{Standard score} = \frac{14(x - m)}{\text{sigma}} + 50$$

Classification Scale

A classification scale is constructed similar to that on the college level in that the "Average" includes 0.5 sigma above and below the mean, or middle 38.30 per cent. The "Good" and "Poor" classifications each include the limits of one sigma of the total scores used to build the table; the two extreme classifications, "Excellent" and "Very Poor," include limits of 1.5 sigma. The decile values are also given.[25]

ANALYSIS OF PHYSIOLOGICAL DIFFERENCES AMONG THE PHYSIOLOGICAL AGE GROUPS

Evidences of Differences Among Groups

When a study was made of the mean values for each of the physiological age groups there was found to be a persistent change from P_1 to P_3. This might be in the nature of a progression or re-

[24] McCurdy and Larson, *op. cit.*, pp. 315-316.
[25] *Ibid.*

gression as exemplified by

	Vital Capacity	Standing Pulse Rate
P_1	2819.88	88.32
P_2	3116.65	87.53
P_3	4575.52	81.91

Of the twenty-one items there were only four in which this positive or negative progression did not occur. (See Table I-A)

A similar comparison showed that the differences as expressed by the critical ratio are greatest between P_1 and P_3 as expressed by sixteen of the twenty-one items, and least between P_1 and P_2. (See Table I-B)

The highest correlations using the bi-serial *r* were in Vital Capacity between P_1 and P_3 and between P_2 and P_3, 0.76 and 0.69 respectively. This may be due to changes in body size. Other correlations among these groups ranged from 0.52 to 0.67 and included the items of Sitting Diastolic Blood Pressure, Sitting Systolic Blood Pressure, Standing Systolic Blood Pressure, the Organic Efficiency Test, and the Short Organic Efficiency Test. (See Table I-C)

Two other methods were used to show that there were differences in the physiological age groups. The first method scored the Organic Efficiency Test using the means of the five cardiovascular items for each age. This yielded the following scores:

Pre-pubescents	53
Pubescents	77
Post-pubescents	233

The second method scored each individual using the Organic Efficiency Test, and scored each individual using the Short Organic Efficiency Test[26] with the following results:

	Short O. E. T.	McCurdy-Larson O. E. T.
Pre-pubescents	—16.2770	—1.2350
Pubescents	—8.1210	+12.5117
Post-pubescents	+17.4180	+140.9375

Each of these methods used the same scoring tables (age 18-34) for all boys regardless of their physiological age so that if there were differences in physiological function these would be reflected by the total or *index* scores.

These scores not only indicate a difference among boys of the three physiological ages but indicate that the Pre-Pubescents are definitely inferior to Pubescents and Post-Pubescents, and that the

[26] Leonard A. Larson, "A Study of the Validity of Some Cardio-Vascular Tests." Reprinted from the *Journal of Experimental Education*, VII:3 (March, 1939), p. 218.

Post-Pubescents are definitely superior to the Pre-Pubescents and Pubescents in physiological function.

The Bi-serial Correlation for the Short Organic Efficiency Test indicates a slight statistical difference between P_1 and P_2, and a highly significant statistical difference between P_2 and P_3, and between P_3 and P_1.

$$P_1 \text{ Vs } P_2 \quad r_{bis} = 0.1118$$
$$P_2 \text{ Vs } P_3 \quad r_{bis} = 0.4155$$
$$P_3 \text{ Vs } P_1 \quad r_{bis} = 0.5246$$

TABLE I—A

ANALYSIS OF PHYSIOLOGICAL AGE IN RELATION TO CARDIO-VASCULAR ITEMS

Cardiovascular Items	Pre-Pubescent N = 103		Pubescent N = 137		Post-Pubescent N = 146	
Standing pulse pressure	M =	37.1700	M =	37.7848	M =	38.5820
	σ =	10.3008	σ =	9.6168	σ =	9.8240
	σ_M =	1.0150	σ_M =	.8216	σ_M =	.8130
Vital capacity	M =	2819.8800	M =	3116.6500	M =	4575.5200
	σ =	464.1200	σ =	610.5000	σ =	876.8100
	σ_M =	45.7311	σ_M =	52.1581	σ_M =	72.5656
Difference between normal standing pulse rate and pulse rate two minutes after exercise	M =	4.0728	M =	4.6168	M =	2.1988
	σ =	9.1572	σ =	8.3700	σ =	7.6620
	σ_M =	.9023	σ_M =	71.51	σ_M =	**.6341**
Breath-holding 20 seconds after exercise	M =	16.9466	M =	17.5948	M =	22.8288
	σ =	5.0836	σ =	5.6568	σ =	7.3840
	σ_M =	.5009	σ_M =	.4858	σ_M =	.6111
Sitting diastolic blood pressure	M =	54.5584	M =	58.0731	M =	69.4864
	σ =	8.7752	σ =	9.3735	σ =	9.6692
	σ_M =	.8646	σ_M =	.8008	σ_M =	.8002
Normal standing pulse rate	M =	88.3156	M =	87.5292	M =	81.9108
	σ =	9.1816	σ =	12.8372	σ =	11.8484
	σ_M =	.9047	σ_M =	1.0967	σ_M =	.9806
Sitting pulse pressure	M =	44.4077	M =	44.9964	M =	46.5412
	σ =	8.7294	σ =	10.7900	σ =	10.4508
	σ_M =	.8601	σ_M =	.9218	σ_M =	.8649
Sitting systolic blood pressure	M =	99.4271	M =	104.0692	M =	116.4864
	σ =	9.8205	σ =	9.7500	σ =	8.6300
	σ_M =	.9676	σ_M =	.8330	σ_M =	.7142
Standing systolic blood pressure	M =	107.0824	M =	110.8831	M =	122.0752
	σ =	9.5800	σ =	9.3966	σ =	8.1728
	σ_M =	.9439	σ_M =	.8028	σ_M =	.6764
Standing diastolic blood pressure	M =	69.6652	M =	70.5913	M =	83.1988
	σ =	9.2032	σ =	9.0570	σ =	8.8436
	σ_M =	.9068	σ_M =	.7738	σ_M =	.7319
Pulse rate two minutes after exercise with breath holding	M =	84.3156	M =	83.1496	M =	79.2260
	σ =	12.2924	σ =	15.8188	σ =	14.5028
	σ_M =	1.2112	σ_M =	1.3515	σ_M =	1.2003

Difference between sitting and standing diastolic blood pressure	M =	15.0826	M =	15.0402	M =	13.2260
	σ =	6.1290	σ =	6.2008	σ =	7.7562
	σM =	.6039	σM =	.5298	σM =	.6419
Difference between sitting and standing pulse pressure	M =	8.6360	M =	9.3906	M =	9.3904
	σ =	5.6070	σ =	6.6306	σ =	6.5420
	σM =	.5524	σM =	.5665	σM =	.5414
Difference between sitting and standing systolic blood pressure	M =	8.8106	M =	7.3906	M =	6.1576
	σ =	5.6758	σ =	5.2662	σ =	5.1036
	σM =	.5593	σM =	.4499	σM =	.4224
Pulse rate two minutes after exercise without breath-holding	M =	93.0924	M =	92.2300	M =	88.2672
	σ =	11.2772	σ =	13.9508	σ =	14.3100
	σM =	1.1112	σM =	1.1919	σM =	1.1843
Pulse rate for the first minute after exercise	M =	103.7960	M =	104.6640	M =	98.9520
	σ =	11.6765	σ =	14.9580	σ =	13.6035
	σM =	1.1505	σM =	1.2779	σM =	1.1258
Pulse rate for the second minute after exercise	M =	90.0095	M =	90.5400	M =	86.1095
	σ =	10.8350	σ =	15.4870	σ =	14.3785
	σM =	1.0676	σM =	1.3231	σM =	1.1900
Pulse ratio for first minute after exercise	M =	.8598	M =	.8435	M =	.8410
	σ =	.0664	σ =	.0653	σ =	.0764
	σM =	.0065	σM =	.0056	σM =	.0063
Pulse ratio for second minute after exercise	M =	.9946	M =	.9797	M =	.9729
	σ =	.0718	σ =	.0790	σ =	.0783
	σM =	.0071	σM =	.0067	σM =	.0065
Organic Efficiency Test	M =	—1.2350	M =	12.5117	M =	140.9375
	σ =	77.9550	σ =	83.3800	σ =	76.2850
	σM =	7.7183	σM =	7.1236	σM =	6.3134
Short Organic Efficiency Test	M =	—16.2770	M =	—8.1210	M =	17.4180
	σ	26.1690	σ =	28.4620	σ =	27.4560
	σM =	2.5785	σM =	2.4317	σM =	2.2773

TABLE I—B

SIGNIFICANT DIFFERENCES AMONG M'S FOR VARIOUS PHYSIOLOGICAL AGES

$$C = \frac{D}{\sigma D}$$

Cardiovascular Items	Pre-Pub. & Pub.		Pub. & Post-Pub.		Pre-Pub. & Post-Pub.	
	Critical Ratio	Chances in 100	Critical Ratio	Chances in 100	Critical Ratio	Chances in 100
Standing pulse pressure	.4671	67	.6941	75	1.0833	85.5
Vital capacity	14.2783	100	16.3245	100	20.4683	100
Difference between normal standing pulse rate and pulse rate two min-						

utes after exercise	.4772	67	2.5295	99.4	1.6957	95
Breath-holding 20 seconds after exercise	.9234	82	6.7016	100	7.4553	100
Sitting diastolic blood pressure	2.9883	99.8	10.0936	100	12.7107	100
Normal standing pulse rate	.5558	71	3.8148	100	4.8174	100
Sitting pulse pressure	.4685	67	1.2228	88	1.7692	96
Sitting systolic blood pressure	3.6347	100	6.1370	100	14.1918	100
Standing systolic blood pressure	3.0787	100	10.6667	100	12.9288	100
Standing diastolic blood pressure	.7768	77	11.8850	100	11.5978	100
Pulse rate two minutes after exercise with breath-holding	.6454	73.5	2.1702	98	2.9869	99.8
Difference between sitting and standing diastolic blood pressure	.0504	52	2.1784	98	2.1087	98
Difference between sitting and standing pulse pressure	.9469	83	0.0000	00	.9730	83.5
Difference between sitting and standing systolic blood pressure	1.9766	97.5	1.9984	97.5	3.7855	100
Pulse rate two minutes after exercise without breath-holding	.5285	69	2.3629	99	2.9753	99.8
Pulse rate for the first minute after exercise	.4998	69	3.3443	100	3.0081	100
Pulse ratio for the second minute after exercise	.3119	62	2.4927	99.3	2.4370	99.2
Pulse ratio for the first minute after exercise	1.9176	97	.2976	61	2.0659	98
Pulse ratio for the second minute after exercise	1.5361	93	.7312	76.5	2.2604	98.6
Organic Efficiency Test	1.3089	90	13.4995	100	14.2595	100
Short Organic Efficiency Test	2.3011	98.9	7.6660	100	9.7945	100

*The number of chances in 100 that the true difference between the means is greater than zero.

TABLE I—C

BI-SERIAL CORRELATION OF ITEMS AND PHYSIOLOGICAL AGE GROUPINGS

$$r_{bis} = \frac{Mp - Mq}{\sigma} \sqrt{Pq}$$

Cardiovascular Items	Pre-Pub. and Pubesc.	Pubescent and Post-Pub	Pre-Pub. and Post-Pub
Standing pulse pressure	.0304	.0411	.0691
Vital capacity	.2570	.6924	.7620
Difference between normal standing pulse rate and pulse rate two minutes after exercise	.0312	.1493	.1084
Breath-holding 20 seconds after exercise	.0584	.3688	.4062
Sitting diastolic blood pressure	.1799	.5136	.6057
Normal standing pulse rate	.0343	.2220	.2799
Sitting pulse pressure	.0293	.0723	.1074
Sitting systolic blood pressure	.2285	.5596	.6765
Standing systolic blood pressure	.1947	.5371	.6436
Standing diastolic blood pressure	.0499	.5760	.5955
Pulse rate two minutes after exercise with breath-holding	.0401	.1282	.1809
Difference between sitting and standing diastolic blood pressure	.0032	.1272	.1267
Difference between sitting and standing pulse pressure	.0597	0.000	.0598
Difference between sitting and standing systolic blood pressure	.1276	.1180	.2373
Pulse rate two minutes after exercise without breath-holding	.0331	.1387	.1778
Pulse rate for the first minute after exercise	.0312	.1960	.1822
Pulse rate for the second minute after exercise	.0192	.1467	.1458
Pulse ratio for first minute after exercise	.1210	.0175	.1270
Pulse ratio for the second minute after exercise	.0963	.0433	.1395
Organic Efficiency Test	.2880	.6690	.6726
Short Organic Efficiency Test	.1118	.4155	.5246

METHOD OF SCORING THE McCURDY-LARSON ORGANIC EFFICIENCY TEST

Before the Organic Efficiency Index can be obtained it is necessary to change the raw scores, i.e., the blood pressure readings, heart rate, etc., to T-scores so that they are comparable and then weight each score according to the value of its contribution to the test. The weightings have been determined by the multiple correla-

tion method[27] and tables have been constructed from which the weighted T-scores can be read direct.[28] These scores when added algebraically yield the Organic Efficiency Index. By selecting the proper Classification Scale (See Tables II, III, and IV), according to physiological age, and by finding the "Score Limits" within which the index score falls, the individual can be rated *Excellent, Good, Average, Poor,* or *Very Poor* according to cardio-vascular efficiency.

TABLE II
PRE-PUBESCENT BOYS
Classification Scale

Decile Values Deciles	Points	Score Limits	Sigma Scales* Classification
100	330		
90	269	252-up	Excellent
80	244		
70	222	210-251	Good
60	198		
50	174		
40	150		
30	132	126-209	Average
20	90	83-125	Poor
10	36	82-down	Very Poor
0	-10		
N = 103		M = 167.7670	σ = 95.8450

Percentage of scores in each classification:

Excellent = 6.45
Good = 24.17
Average = 38.30
Poor = 24.17
Very Poor = 6.45

* One sigma for each classification; 1.5 sigma for the two extreme classifications.

TABLE III
PUBESCENT BOYS
Classification Scale

Decile Values Deciles	Points	Score Limits	Sigma Scales* Classification
100	450		
90	289	264-up	Excellent
80	248		
70	219	216-263	Good
60	192		
50	169		
40	150		
30	123	121-215	Average
20	96	74-120	Poor

27 James H. McCurdy and Leonard A. Larson, "The Measurement of Organic Efficiency for the Prediction of Physical Condition in Convalescent Patients," *Research Quarterly,* VI:4 (December, 1935), p. 6.

28 Dane, *op. cit.*

10	36	73-down	Very Poor
0	-10		
N=137		M=169.3540	σ=95.8450

Percentage of scores in each classification:

Excellent = 6.45
Good =24.17
Average =38.30
Poor =24.17
Very Poor= 6.45

* One sigma for each classification; 1.5 sigma for the two extreme classifications.

TABLE IV
POST-PUBESCENT BOYS
Classification Scale

Decile Values Deciles	Points	Score Limits	Sigma Scales* Classification
100	450		
90	282	256-up	Excellent
80	232	211-255	Good
70	202		
60	180		
50	159		
40	134	121-210	Average
30	110		
20	90	76-120	Poor
10	61	75-down	Very Poor
0	-10		
N=146		M=182.9920	σ=7.4554

Percentage of scores in each classification:

Excellent = 6.45
Good =24.17
Average =38.30
Poor =24.17
Very Poor= 6.45

* One sigma for each classification; 1.5 sigma for the two extreme classifications.

SUMMARY AND CONCLUSIONS

THE PURPOSE

The purpose of this study is: first, to determine within the physiological age groupings of boys whether there are changes in the various circulatory-respiratory items; second, if changes are found, to determine whether these are significant; and, third, if they are significant, to set up age norms and classification tables for boys according to each of the physiological ages.

LIMITATIONS

This study is limited to junior and senior high school boys. It bases its standards for dividing boys into the three physiological age groups on the pubic-hair criterion.

Significance

It has been shown that many changes take place during the adolescent period, but whether these changes are reflected by cardiovascular tests has not been clinically determined. If there are changes in circulatory-respiratory function, norms should be constructed by which individuals can be compared and their functional efficiency appraised.

Method of Collecting Data

The Organic Efficiency Test was administered to 386 boys of the Classical High School, Buckingham Junior High School, and Forest Park Junior High School of Springfield, Massachusetts. Two examiners were used, each specializing in administering part of the test, and the tests were conducted under strict laboratory conditions.

Organization and Statistical Method

Having divided the boys into the three physiological age groups an item-by-item examination of the data was made. This was done by four different methods:

1. Means compared directly.
2. Critical ratio compared to show magnitude of differences among groups.
3. Bi-serial correlation.
4. Standard Error of the Mean and Differences.

CONCLUSIONS

1. A gradual change takes place in the physiological variables as age increases from Pre-Pubescent to Post-Pubescent. (See Table I-A).
2. The least change is noticed between the Pre-Pubescents and the Pubescents and the greatest change between the Pre-Pubescents and the Post-Pubescents.
3. Post-Pubescent boys are highly superior and Pre-Pubescent boys are the least efficient in circulatory-respiratory function.
4. The three physiological age groups are significantly different, and each needs a scoring table by which to calculate the circulatory-respiratory efficiency of a boy according to his growth status.

Physiological Maturity As a Factor in the Qualification of Boys for Physical Activity

By Anna Espenschade
University of California, Berkeley

THE present widespread recognition of the need for optimum physical development of all young American boys has resulted in an increased emphasis upon vigorous physical activity programs, especially for boys in the senior high school. The adaptation of the boy to activity depends upon many factors other than those passed upon by the physician in a brief medical examination. It is a well known fact that older, taller, and heavier boys tend to be stronger and in general more proficient in motor performance than are younger, shorter, and lighter boys. Because of these differences, classification indices[2, 6] * for physical performances developed through statistical treatment of extensive data have furnished a practical means for rapid assessment of the factors of age, height, and weight, thus making participation and competition both safer and fairer for the participants. The influence of puberty upon motor performance has been observed[3] but the difficulty of determining "physiological age" in the male has made adequate consideration of this factor infrequent.

In the adolescent growth study at the University of California[5] seriatim measures of motor performance and also of body dimensions, x-rays of bone areas, serial photos, and ratings by physicians provide excellent data for investigation of the problem of maturity. The cycle of puberty in the male has been divided into three phases or zones[4] on the basis of several criteria, among them changes in the velocity of growth (per cent increment) of certain body dimensions, change in the velocity of growth of penis and testes, and developmental rating of pubic hair (Davenport Scale). The range of maturity of boys of the adolescent study at specific chronological ages and in certain school grades is shown in Table I. It is clear that chronological ages 13, 14, and 15 and school grades 8, 9, and 10 include the widest range of development. At the same time, a number of 16-year-olds and a few 17-year-olds are still pubescent, although the majority are mature.

The relationship of physiological maturity to performance in the 50-yard dash, the standing broad jump, the jump and reach, distance throw, and Brace Test may be seen in Table II. Data for the half year averaging 12.75 have been included, although the number of cases is small, because of the consistent negative relationship be-

* Superior figures refer to numbered bibliography at end of article.

tween achievement and maturity found at this time. A glance at Table I will show that the boys of this age group are just entering the cycle of puberty. At 13 and especially at 14 and 15 the more mature boy tends to have an advantage in activity. (The size of the correlation at 16 is influenced by the slight range of maturity represented at this age.) Thus it would appear that during the cycle of puberty the average boy is less well adapted to performance than he is either before or after this stage. The performance in the Brace Test especially is influenced by the degree of maturity. Many boys during this period of rapid growth are evidently less well coordinated, less flexible, and less well controlled in motor performance. Perhaps the psychological aspect of performance is important here. The pubescent boy tends to be less stable emotionally, less poised, and so less able to perform individually the unaccustomed stunts included in the Brace Test.

Physiological maturity will undoubtedly correlate to some extent with the California Classification Index,[2] since all phases of development are intrinsically bound together. The classification index, based as it is upon chronological age, height, and weight is readily computed and frequently used as a basis of grouping boys for physical activity. In California, interscholastic competition is scheduled in most cases only between teams made up of boys within the same classification. Class A includes the older, taller, and heavier boys. These boys make up the high school varsity teams and play the most strenuous schedule of games. The range of maturity of

TABLE I

RANGE OF PHYSIOLOGICAL MATURITY OF BOYS IN THE ADOLESCENT STUDY

A. By Chronological Age

Age in Years	Maturity I	II	III	Post-pubescent
12	66*	33		
13	29	65	05	01
14	07	65	26	02
15	01	40	49	10
16		04	31	65
17		04	04	92

B. By Grade in School

Grade in School	Maturity I	II	III	Post-pubescent
8	32*	60	05	03
9	10	68	18	04
10	01	35	49	15
11		09	35	56
12			28	72

* Percentage

TABLE II

CORRELATIONS OF MOTOR TESTS WITH PHYSIOLOGICAL MATURITY
CHRONOLOGICAL AGE HELD CONSTANT

	Age in Years									
	No.	12.75	No.	13.25	No.	14.25	No.	15.25	No.	16.25
Dash	12	−.56	32	.16	78	.36	55	.33	34	.52
Broad Jump	12	−.21	29	.38	78	.29	59	.32	38	.24
Jump & Reach	12	−.24	35	.01	78	.20	56	.24	40	.16
Distance Throw	13	−.26	35	.09	79	.35	55	.34	40	.12
Brace Test	13	−.67	35	−.27	76	.03	58	.18	44	.33

adolescents by class letters in junior and senior high schools is shown in Table III. Although there is some indication of a reduction in variability within the classes over chronological age alone or grade in school, considerable variation remains. Correlations of classification letters with maturity according to school grade are shown in Table IV.

It is obvious that classification letters as now computed do not group students nor equate opponents according to physiological maturity. How does this affect the individual boy? Two principal types of boy must be considered. The first is the boy of small stature and slight build who matures early. In high school, for example, we may find a boy in Class C who has reached the post-pubescent phase of development. A return to Table IIIB will show that in the adolescent study 9 per cent of Class C is made up of boys of this type. Certainly no physical danger will come to these boys as they are grouped in all cases with boys functionally less mature than they themselves are.

The other type of boy for whom the classification index is inadequate is the big boy who matures late. Thus in the adolescent study, 5 per cent of the boys in Class A are only in the second phase of the cycle of puberty while 62 per cent are post-pubescent. A glance at the records of three of these immature boys will be of interest.

I. Jack entered senior high school at 15.3 years of age. He was tall and heavy and was in Class A for physical activities. He was in the second phase of the cycle of puberty; his skeletal age[1] was 15. His average score on the gross motor tests was 56.8.* He appeared to be interested in sports but was not skillful enough to participate in interscholastic athletics. A year and a half later, Jack was rated mature physiologically. At this time his average score on the motor tests was 68.2. He tried out for the school basketball team and made the squad.

II. Hal entered senior high school at age 15.5 years. A year and a half later, aged 17, he was classified A for physical activities; was in phase 2 of the cycle of puberty; had a skeletal age of 14.5. His average sigma score on the motor tests was 47.0; approximately the same as it had been throughout junior high school. He took no special interest in sports but participated

* Scores computed for the Grade group with the mean at 50 and a standard deviation of 10. For details of motor test, see reference No. 4.

in the regular physical education program.

III. Bert entered senior high school at 15.4 years of age. At this time he was classified A for physical activities; was placed in phase 2 of the cycle of puberty; had a skeletal age of 14.5. His average sigma score on the motor tests was 43.0. He showed a feminine distribution of fat on his body. He was poor at motor performances and disliked taking part in them. At 17.5 years of age, he was physiologically and skeletally mature, had outgrown any femininity of build, but showed no interest in activity.

TABLE III

RANGE OF PHYSIOLOGICAL MATURITY OF BOYS OF THE ADOLESCENT STUDY, BY CLASSIFICATION LETTERS

A. Junior High School

	Maturity			
Class	I	II	III	Post-pubescent
C	60*	40		
D	54	46		
E	31	67	02	
F	03	88	05	03
G	01	76	19	04
H		61	36	03

B. Senior High School

	Maturity			
Class	I	II	III	Post-pubescent
D		76*	24	
C		54	37	09
B		07	53	40
A		05	33	62

*Percentages.

TABLE IV

CORRELATIONS OF CLASSIFICATION LETTERS WITH PHYSIOLOGICAL MATURITY FOR CERTAIN GRADES IN SCHOOL

Grade	No.	r
8	73	.54
9	75	.62
10	45	.50

It would seem from the above cases that there is little likelihood of danger or injury to these boys from participation in inter-scholastic sports. Their very immaturity protects them as it is doubtful that any such boy would be good enough to make the team.

Thirty-three per cent of the boys in Class A are in the third phase of the cycle of puberty. The great majority of these big boys enter senior high school during their fifteenth year of age. Within a year, they become physiologically mature. Two boys of this type were superior athletes.

IV. Dick entered senior high school at 15.8 years of age. He was in Class A; the third phase of pubescence; skeletal age 16.5 years. His average motor test score was 69.0. He went out for football and made the first squad although he was not a "regular" on the first team. The following year, he was fully mature, his average motor test score was 70.3. He played regularly on the first team.

V. Ernie entered senior high school at 14.5 years of age. He was in Class A; was in the third phase of the cycle of puberty; skeletal age 16. His motor test average score was 61.3. He went out for basketball but did not make the team until the next year. At this time he was physiologically mature, increased his average motor test score to 66.4.

Three other boys of the adolescent study showed comparable physical and physiological development with the above cases, but differed from them in their motor ability scores (averaging about 56.0). Each of these three tried out for athletic teams without success. Undoubtedly, superior skill as well as physique and maturity are required for excellence in athletics.

There is no evidence of injury or strain to either Dick or Ernie from participation in sports. Both boys played throughout high school and Ernie continued to play intercollegiate basketball through college. The possibility of strain is present in the regular physical education program of today, however, for boys who are not yet mature at 17 and especially for boys like Hal who are tall and heavy and so appear stronger and more able than they are. There will be relatively few cases, of course, of boys who reach the age of 17, are tall and heavy, and who are still in the early phases of puberty. A greater percentage of 17-year-olds will be in the third phase or very nearly mature physiologically. It has been shown elsewhere[3, 4] that boys who mature relatively late tend to be below the average of their fellows in motor performance. The pubescent and recently post-pubescent boy does not have the physical strength of mature boys of the same height and weight. Although an accurate assessment of physiological maturity cannot be made at one physical examination, the rough classification afforded by the Davenport Scale should be adequate to identify the immature boy. With the current emphasis on strenuous pre-induction physical training programs for 17-year-olds, only those boys who are physiologically mature as well as organically sound should be expected to participate without restriction.

BIBLIOGRAPHY

1. Bayley, Nancy, "Size and Body Build of Adolescents in Relation to Rate of Skeletal Maturing," *Child Development,* 14 (1943), pp. 51-89.
2. Cozens, F. W., M. H. Trieb, and N. P. Neilson, *Physical Education Achievement Scales for Boys in Secondary Schools* (New York: A. S. Barnes and Co., 1936).
3. Dimock, Hedley, S., "A Research in Adolescence, I. Pubescence and Physical Growth," *Child Development,* 6 (1935), pp. 176-195.
4. Espenschade, Anna, "Motor Performance in Adolescence," *Monog. Soc. Res. Child Development* (1940) V: 1, p. 126.
5. Jones, Harold E., "The California Adolescent Growth Study, *J. Educ. Res.* (19?) 31: 8, pp. 561-567.
6. Neilson, N. P., and F. W. Cozens, *Achievement Scales in Physical Education Activities for Boys and Girls in Elementary and Junior High Schools.* (Sacramento: California State Dept. of Education, 1934).

A Study of the Health Practices, Knowledge, Attitudes and Interests of Senior High School Pupils

By Warren H. Southworth
Field Representative for the American Social Hygiene Association
Chicago, Illinois

and Jean V. Latimer
Massachusetts Department of Public Health
Boston, Massachusetts

and Clair E. Turner
Massachusetts Institute of Technology
Cambridge, Massachusetts

DURING 1941-42 under a Joint Committee on Health Education of the Massachusetts Departments of Education and of Public Health, a study was made of the health education in senior high schools. The purpose of the study was to survey the health activities now in operation, to discover the factors which are directly related to the present physical status of youth, and to use such information for the building of a more effective health program for high schools.

This paper presents the results of a part of the study which was concerned with the health practices, knowledge, attitudes, and interests of a large state-wide sample of high school pupils in representative communities. On a basis of their size, type of community (rural, industrial, residential), geographic distribution, and economic status, twenty-seven schools were selected with a total of 15,480 pupils in grades 10, 11, and 12 available for taking a series of four objective, paper and pencil health tests. This number of pupils represents approximately 9 per cent of the public high school population for the entire state (170,000). However, in order to expedite scoring and item counting, without altering the representative value of the sample, the number of pupils taking the tests in any one high school was limited to 600, thereby reducing the total pupils participating to about ten thousand.

Since there were no suitable objective tests available, four health tests were designed and constructed especially for the study. A perfect score on any one of these tests is 100. On the test concerned with health practices ("What Do You Do?") the average score for boys in all grades is in the neighborhood of 53, and the average score for girls in all grades is in the neighborhood of 61.

Insofar as this test is an accurate reflection of health practices, it appears that the quality of health practices remains constant throughout the high school period with no improvement from grade to grade. No significant difference is reflected in the quality of health behavior of high school pupils in different types of communities (industrial, rural, or residential). Girls, however, have a consistently better rating than boys.

On the health knowledge test ("Health Information, Please!") the averages for boys and girls are alike, and again there are no differences between the different types of communities. There is a slight improvement from grade to grade. Possibly courses given in the tenth grade such as general science, biology, civics, hygiene, and health may be responsible for the slight increase in health knowledge between the tenth and eleventh grades. The average score in grade ten is approximately 70.7; that in grade eleven is 73.4; and in grade twelve 74.8.

In the attitudes test ("Your Opinion, Please!") there is little difference between the scores in different types of communities. The averages for boys in rural communities are consistently a point or so above those of any other type of community, but this is not a statistically significant difference. The average scores in the attitude test rise only slightly from grade to grade, being approximately 73.4 for grade ten; 74.2 for grade eleven; and 75.2 for grade twelve.

Included in this paper with each test are summaries of the results on a state-wide basis. Opposite each question is the percentage of correct answers made by the pupils who took the tests throughout the state. Also opposite each question or statement is the key to the correct answer.

Beside each question in the health interests test ("Your Choice, Please!") there is shown the percentage of pupils who reported they were interested in the question. In addition, each pupil was given an opportunity to write some questions, other than those in the test booklet, which he would want to have answered in a high school health course. Three thousand pupils wrote a total of 4,107 questions in the designated space on the answer sheet.

Table I shows the results of classifying pupils' questions according to various health topics. More than one-third of the questions asked by pupils were of such an individual nature that they probably would be answered best by the school physician or school nurse rather than through classroom discussion. Questions other than those seeking medical advice, which occurred most frequently, are related to: care of skin, posture and exercise, nutrition, care of hair, acute diseases (especially colds), mental health, body height and weight, oral hygiene, use of tobacco and chronic disease (cancer in particular). Relatively few questions were asked which could be

classified as related to topics of community health. Although no questions relating to sex appear in any of the health tests, pupils asked a total of 73 questions about social hygiene.

TEST I

WHAT DO YOU DO?

Directions: The following list of items represents some activities in which people engage. Read each item and in the blank on the answer sheet corresponding to the number of the item, blacken the space as follows:

1. Under A (Always) if *you* do it often—or it happens to you at regular intervals.

2. Under O (Occasionally) if *you* do it once in a while—or it happens to you sometimes.

3. Under N (Never) if *you* never do it—or it never happens to you.

Please indicate how each item fits into *your* activities.

Examples:

		A	O	N
1. Drink 3 or more glasses of milk daily.	1.	▮	‖	‖
2. Wash food down with water.	2.	‖	‖	▮

Statement	*Key*	*Per cent of Correct Answers*
1. Eat some vegetables or fruit every day.	A	90
2. Diet by consuming a smaller portion of everything you are accustomed to eating.	N	61
3. Include additional salt (common table salt or salt tablets) in the diet during the hot weather months.	A	18
4. Use vitamin capsules and/or cod liver oil to supplement regular diet.	A	8
5. Keep erect when sitting.	A	31
6. Eat essentially the same diet (type and amount) in the summer as you do in the winter.	N	53
7. Consciously try to get "balanced meals" when eating at cafeterias or restaurants.	A	44
8. Eat your meals at the same time each day.	A	57
9. Worry about yourself.	N	31
10. Eat slowly and chew your food well.	A	56
11. Go swimming within a half hour after eating.	N	66
12. Keep erect when standing or walking.	A	58
13. Zigzag through traffic on your bicycle.	N	80
14. Exercise outdoors.	A	61
15. Walk with the toes pointing outward.	N	57
16. Wash hands before eating or handling food.	A	85
17. Cleanse your face thoroughly with warm water and soap before retiring.	A	65
18. Wash hands after leaving the toilet.	A	86
19. Use an individual towel and wash cloth.	A	54
20. Dry your feet thoroughly after bathing.	A	85
21. Use a deodorant in the armpits.	A	40
22. Have your hair shampooed once a month.	A	69
23. Massage the scalp by brisk brushing and rubbing.	A	49
24. Use your own comb, brush, and other toilet articles.	A	77

Statement	*Key*	*Per cent of Correct Answers*
25. Bite fingernails.	N	58
26. Avoid letting people talk into your face.	A	57
27. Take a shower after exercise.	A	35
28. Expose the body to a strong dose of sunburn early in the swimming season so that the skin will tan on subsequent exposure to sunlight.	N	47
29. Keep fingernails trimmed and clean.	A	65
30. Visit a dentist once a year.	A	65
31. Each day eat some foods requiring vigorous chewing.	A	61
32. Use mouth washes to prevent or eliminate bad breath.	N	24
33. Brush your teeth daily.	A	83
34. Brush your gums when you brush your teeth.	A	48
35. Go promptly to the dentist at the first suspicion of tooth trouble.	A	50
36. Blow the nose vigorously.	N	45
37. Cover coughs and sneezes with the hand.	N	8
38. Carry a clean handkerchief every day.	A	74
39. Read when lying down.	N	27
40. Use strongly scented soaps to prevent body odor.	N	59
41. Take a laxative when you have an abdominal pain.	N	54
42. Take a laxative or cathartic if elimination does not take place at least once a day.	N	37
43. Give some thought to the appearance of your clothing: how it is worn, color combinations, appropriateness.	A	88
44. Wear fashionable shoes, even if they are slightly uncomfortable.	N	77
45. Wear tight collars or garters.	N	76
46. Go to bed at a regular time each school night.	A	28
47. Open a blister to remove its watery content.	N	42
48. Leave small cuts and scratches until it is convenient to care for them.	N	54
49. Consult your physician promptly when you discover any unusual physical condition.	A	56
50. Use bicarbonate of soda or similar substances to prevent indigestion.	N	61
51. Have physical defects corrected as soon as possible.	A	73
52. Refuse to ride in a car when the driver has had a drink or two, but is not obviously intoxicated.	A	49
53. Use tobacco.	N	72
54. Read the label on any patent medicine before you buy it to check on its narcotic content.	A	62
55. Use patent medicine for a cough.	N	33
56. Have a medical or health examination yearly. (In addition to any at school).	A	33
57. Budget your time and try to stay within this plan.	A	22
58. Daydream when things become uninteresting.	N	12
59. Determine your weight regularly.	A	59
60. Follow a fashionable diet for reducing.	N	85
61. Treat colds promptly.	A	71
62. Use disposable paper tissues when you have a cold.	A	44
63. Walk without shoes or sandals in the locker room.	N	61

Statement	*Key*	*Per cent of Correct Answers*
64. Stay in swimming until you are cold and shivery.	N	59
65. Suffer from indigestion.	N	65
66. Use milk that has not been pasteurized or certified.	N	71
67. Patronize only those soda fountains which thoroughly wash or sterilize the glasses, or use paper cups.	A	73
68. Observe special care in handling food or dishes to be used by others when you have a cold or sore throat.	A	80
69. Eat apples, plums, and other fruit without having them washed.	N	39
70. Check on the purity of drinking water when hiking, camping, picnicking, or traveling.	A	72
71. Use a common drinking cup.	N	40
72. Touch lips to the bubbler of a drinking fountain.	N	90
73. Use public drinking fountains at which the water falls back onto the bubbler.	N	53
74. Walk on right-hand side of road when walking along a highway.	N	37
75. Wipe hands dry before handling electrical fixtures or appliances.	A	82
76. Ride two on a single bicycle.	N	39
77. Have some vigorous exercise daily.	A	47
78. Talk into other persons' faces.	N	72
79. Dispose of garbage at a picnic by spreading it on the ground for the birds.	N	82
80. Put used paper towels into the disposal receptacle.	A	91
81. Take precautions in the use of public toilet facilities.	A	88
82. Use the gutter for disposing of small bits of rubbish.	N	53
83. Leave garbage exposed so that it will oxidize and create less odor.	N	67
84. Leave papers and waste on tables in school cafeteria.	N	84
85. Observe order and cleanliness in the care of your school locker.	A	69
86. Know the location of the fire extinguishers on each floor of your high school building.	A	55
87. Try to keep up to date your knowledge of what to do in regard to communicable diseases.	A	50
88. Share your health knowledge with the members of your family and others.	A	64
89. Count ten before you explode in anger.	A	15
90. Spit on the sidewalk.	N	73

SUMMARY OF RESULTS ON A STATE-WIDE BASIS

Average for boys	53.34	57.35
Average for girls	60.84	
Standard deviation	12.57	
Range of scores	17-96	
Total number of pupils taking test	9647	

TEST II

HEALTH INFORMATION, PLEASE!

Part I

Directions: Read each of the following statements. If you think a statement is *true,* blacken the space marked "T" on the line on the answer sheet numbered the same as the statement; if you think the statement is ***false,*** blacken the space marked "F."

Examples:

		T	F
1. We should have fresh air all the time.	1.	|	||
2. Milk should be used only by young children.	2.	||	|

Statement	*Key*	*Per cent of Correct Answers*
1. Taking soda for an acute cold is scientifically correct.	F	76%
2. Children need less protein in proportion to their weight than do grown people.	F	81
3. It is not important to see a doctor unless we need treatment of some sort.	F	92
4. A refined cereal has less food value than a whole-grained cereal.	T	68
5. Carbon monoxide gas cannot be detected by its odor.	T	59
6. Green vegetables are low in fuel value.	T	14
7. The best time to take a warm bath is just before going to bed.	T	88
8. Now that smallpox is so rarely found, there is really no reason to be vaccinated.	F	99
9. Exercise is necessary for healthy muscles and nerves.	T	97
10. Lanolin or olive oil is effective in the prevention of chapped hands.	T	78
11. A clean tooth never decays.	F	61
12. The infant death rate has been reduced through the assistance of a health education program by the government.	T	89
13. The state department of health confines its activities to the control of epidemics.	F	66
14. Dark green curtains in the classroom are better for the eyes than light tan ones.	F	72
15. The best way to protect yourself from catching cold is to gargle the throat every night.	F	53
16. Bubble fountains with a vertical stream are more hygienic than those with a side stream.	F	68
17. An individual's health is likely to be unaffected by the public health program of the community in which he lives	F	76
18. When an artery has been cut, pressure should be applied between the cut and the heart.	T	84
19. Tuberculosis is inherited.	F	69
20. A proper diet should contain raw foods.	T	84
21. City ordinances or laws against spitting are unnecessary.	F	87
22. Standing is more fatiguing than walking.	T	80

Statement	Key	Per cent of Correct Answers
23. The terms *registered nurse* and *practical nurse* mean the same thing.	F	95
24. An infection of the nose or throat can easily be spread to the middle ear.	T	90
25. Alcohol renders the sense organs more sensitive to stimulation.	F	39
26. Milk is pasteurized to make it more digestible.	F	91
27. A sense of humor keeps one from taking either himself or the world too seriously.	T	75
28. Complexion lotions make a beautiful skin.	F	86
29. The most serious type of fatigue is produced by emotional strain.	T	86
30. Knowledge about healthful living insures healthful practices.	F	14
31. The frequency of shampooing the hair depends upon the kind of hair, the atmosphere, and one's activities.	T	70
32. The movement of air in a living room is more important than the oxygen and carbon dioxide content of the air.	T	17
33. If all green plants were destroyed man would soon starve.	T	79
34. The first set of teeth do not need as careful supervision as the second set of teeth.	F	73
35. Pyorrhea can be cured by medicated tooth pastes.	F	76
36. It is safe to swim after eating if one first rests ten or fifteen minutes.	F	90
37. Plenty of refreshing iced drinks should be used when the body is overheated.	F	92
38. There are no bacteria on anything that is sterile.	T	57
39. If an individual is free from obvious disease he should be satisfied with his health.	F	84
40. A feather duster is excellent for dusting woodwork.	F	71
41. One should walk on the left-hand side of the road if there is no sidewalk.	T	78
42. Less food is needed if one chews his food well.	T	35
43. Advertising heard over the radio, as to what is good for health, is always true.	F	95
44. The best way to protect a community against mosquitoes is to screen all the houses.	F	74
45. Constipation can be prevented by taking castor oil once a week.	F	59
46. A person's size and activity are better guides than appetite to the amount of food which he should eat.	T	63
47. Bacteria grow best in sunlight.	F	78

Part II

Directions: For each of the following questions, select the word or statement which you think completes the sentence most appropriately; then blacken the space on the answer sheet corresponding to the answer you have chosen.

Example:

1. A communicable disease is one which

a. Is never dangerous b. Cannot be given to another person c. Is spread from sick people to well people d. Is always curable.

	a	b	c	d
1.	||	||	|	||

Statement	*Key*	*Per cent of Correct Answers*
48. Of the following, the food which contains the most calcium for building strong teeth is a. Meat b. Cabbage c. Milk d. Spinach	c	86%
49. Mosquitos carry a. Typhoid fever b. Malaria c. Diphtheria d. Hookworm disease	b	75
50. Bacteria are best killed by a. Cold b. Moisture c. Sunshine d. Centrifugal force	c	73
51. Schools and other educational institutions should furnish a. Regulation of hours of labor b. Protection against dangerous and unsuitable drugs c. Health examinations to discover need of medical care d. A means of disposing of garbage	c	87
52. A disease sometimes conveyed through unpasteurized milk is a. Tuberculosis b. Cancer c. Rheumatism d. Measles	a	95
53. The diseases which are on the increase today are those found among a. Infants b. Children c. Young adults d. Middle-aged people	d	20
54. The chief work of most private health agencies is to furnish a. Sanitary disposal of sewage b. Information on health matters c. Protection against pollution of rivers, lakes, and bathing beaches d. Quarantine regulations to prevent communicable diseases	b	53
55. Of the following, the food containing the largest amount of minerals is a. Sugar b. White rolls c. Tomato d. Lard	c	57
56. People need to drink plenty of water daily because a. Water furnishes power to work b. The body needs to replace water lost through excretion c. Water gives heat d. Water thins blood	b	81
57. For the best source of protein choose a. Eggs and meat b. Cabbage and lettuce c. Potato and bread d. Bacon and butter	a	70
58. Of the following, the best way to prevent the spread of communicable disease is for all well people a. To keep all the windows closed b. To work only six hours a day c. To keep the house warm d. To avoid close contact with sick people	d	98
59. Bacteria in bedding from a tuberculosis patient are best killed by a. Putting the articles in strong sunlight b. Airing them in the room c. Burning sulphur in the room. d. Filling the air with formaldehyde gas	a	64

Statement	*Key*	*Per cent of Correct Answers*
60. Shoes to be healthful should a. Be much larger than the foot so that it can spread b. Have straight inner lines c. Throw the weight well forward on the toes. Have rubber soles	b	41
61. A clinic is an institution which is designed to supply a. Health certificates b. Services of physicians and nurses to patients who are unable to pay for private care, but are physically able to go to such places for treatment. c. International uniformity on vital statistics d. Free clothing and food for persons unable to provide for themselves	b	90
62. Which of the following is least expensive to the people of a community? a. To have no definite health program b. To run a hospital for members of the community needing medical attention c. Care for the sick at home and pay the other costs of sickness. d. Prevent disease through hygienic living and through the work of a health department	d	88
63. The most common way for disease germs to enter the body is through a. The respiratory system b. The digestive system c. The eyes d. The pores of the skin	a	40
64. If a city or state inspector requires a farmer to take care of his cows in a certain way in order to be allowed to sell milk, it is a. Against the law b. Improper interference with private business c. A violation of personal rights d. Proper interference with private business	d	84
65. There should be a health agency supported by a. Taxes b. Private contributions c. National Red Cross d. Doctors of a community	a	55
66. A good rule about medicine is to take medicine a. Which is said to cure everything b. Every night c. Only when a physician prescribes it d. Which makes one feel better right away	c	97
67. For most pupils, the best combination for a school lunch is a. Hot roast beef sandwich, potato, rolls, butter b. Macaroni, fruit salad, rolls, butter, cake c. Banana fritters, milk, rolls, butter d. Cream of asparagus soup, chopped celery and rye bread sandwich, apple sauce, ginger bread	d	52
68. The best dinner for most people is a. Hamburg steak, french fried potatoes, milk, chocolate cake b. Creamed chicken, lettuce and tomato salad, apple pie c. Soup, roast beef, baked potato, carrots, raw cabbage salad, custard d. Soup, fried chop, mashed potato, peas, cookies	c	77
69. Of the following, the food containing the largest amount of Vitamin C is a. Beef b. Oranges c. Milk d. Apples	b	51

	Key	*Per cent of Correct Answers*
70. The work of a private health agency should be a. Quarantine b. School examinations c. Immunization and vaccination d. Planning and demonstration of health programs	d	70
71. An agency legally responsible for protecting the local milk supply is a. The local board of health b. The farmers' union c. The United States Public Health Service d. The local Grange	a	47
72. For which of the following *groups* of diseases can a person be immunized?	c	75

a.	b.	c.	d.
Arthritis	Pneumonia	Typhoid Fever	Mumps
Cancer	Heart trouble	Diphtheria	Grippe
Chicken pox	Tuberculosis	Lockjaw	Hay fever
Warts	Influenza	Small pox	Typhus fever

Part III

Directions: Below you will find 6 sets of broken sentences. In each set there are three "beginnings" and five "endings." On the answer sheet beside the number of the "beginning," blacken the space under the letter corresponding to the *best* "ending." There are more endings than you will need.

Examples:

		a	b	c	d	e
1. Protein	a. is necessary for building tissue	1.				
2. Kidney	b. is an important organ of digestion	2.				
3. Blood	c. contains many tubules	3.				
	d. helps move muscles					
	e. contains red cells					

Beginnings	*Endings*	*Key*	*Per cent of Correct Answers*
73. Health of the community	a. kills many germs	d	93%
74. Sunshine	b. should be very clean	a	83
75. A drug habit	c. is very difficult to cure	c	94
	d. depends upon cooperation of everyone		
	e. improves a person's mind		
76. Body weight	a. is dangerous to health of garage men	c	83
77. Garbage	b. can be reduced by segmentation	d	67
78. Lead in gasoline	c. should be determined regularly	a	66
	d. can be incinerated		
	e. is a source of free nitrogen		
79. Clothing	a. should have plenty of fresh air	c	93
80. A bedroom	b. shows who is susceptible to disease	a	81
81. Immunization	c should be suited to weather and activity	d	74
	d. gives protection against a particular disease		
	e. requires cleaning every other day		
82. Tobacco	a. supplies energy	c	66

Beginnings	*Endings*	*Key*	*Per cent of Correct Answers*
83. A balanced diet	b. contains caffeine	e	85
84. Starchy food	c. may cause irregular heart action d. produces thyroid enlargement e. contains food elements in the right proportion	a	46
85. Sinus infection	a. is a dangerous disinfectant	b	63
86. Bichloride of mercury	b. is a common disease of the respiratory organs	a	66
87. Anemia	c. increases resistance to colds d. is a digestive juice e. can result from poor nutrition	e	63
88. Yellow fever	a. may be caused by breathing bad air	c	91
89. Diseased gums	b. causes brittle bones	d	79
90. Scarlet fever	c. is transmitted by mosquitoes d. may be caused by deficient diet e. is transmitted directly from a sick person to a well one	e	80

SUMMARY OF RESULTS ON A STATE-WIDE BASIS

Average	73.10
Standard deviation	8.78
Range of Scores	36-95
Total number of pupils taking test	9768

TEST III
YOUR OPINION, PLEASE!

Directions: The following statements represent opinions about various phases of health and *you are to express your own point of view about them.* Indicate how you really feel about each statement immediately after you read it. Do not pause too long on any one of them. Read each item and in the blank on the answer sheet corresponding to the number of the item, blacken the space as follows:

1. Under A (Agree) if *you agree* with the whole statement.
2. Under U (Uncertain) if *you* are *uncertain* about the whole statement.
3. Under D (Disagree) if *you disagree* with the whole statement.

Examples:

		A	U	D
1. All children should be allowed to play with fireworks.	1.	||	||	|
2. Children should drink milk.	2.	|	||	||

Statement		
1. If a person believes that any fat or starchy food causes his skin to be excessively oily, he should follow a prescribed diet.	A	51%
2. The natural form of vitamins obtained from foods (balanced diet) causes the vitamins to be more effective in the body than when they are obtained from vitamin capsules.	A	87
3. There is no danger of disease from raw, unwashed fruits and vegetables.	D	86

Statement	*Key*	*Per cent of Correct Answers*
4. If one is going on a diet, he should do so under a physician's guidance.	A	93
5. The only purpose of food is to develop a strong muscular body.	D	75
6. One should select a balanced meal when ordering food in a cafeteria or restaurant.	A	88
7. A high school student should play at least one sport which he will be able to carry on after school days are over.	A	64
8. A person who is well and strong does not need to give any thought to the kind and amount of food he eats.	D	92
9. If two people maintain that the use of certain foods produces different effects on the skins of different persons, one or the other or both probably made incorrect observations.	D	42
10. The peddler of narcotic drugs should be given a jail sentence.	A	73
11. Any effects resulting from the over-use or misuse of cosmetics are entirely the concern of the person involved.	D	24
12. More people should take advantage of the various commercial products advertised for improving the appearance of the skin.	D	74
13. Everyone should strive to attain a strong muscular physique.	D	6
14. Government agencies should do something about the millions of people in the country who are undernourished.	A	82
15. Each high school student should have a hobby.	A	80
16. The exhaust system of an automobile should be examined occasionally for leaks.	A	80
17. An individual is inconsiderate if he refuses to lend his towel to another person who needs one.	D	89
18. Being able to see the print clearly is a good test of whether or not one is using enough light for reading.	A	32
19. A person who can read without glasses does not need glasses.	D	79
20. There is no need for going to the dentist if one has strong teeth which are brushed every day.	D	89
21. The hair should be washed every week regardless of whether or not it is oily.	D	34
22. Every person should be compelled to treat his feet (stepping into a solution) before entering a public shower room.	A	82
23. All high schools should offer a course in health.	A	82
24. Ordinarily there is little danger of catching a disease by wearing new clothing before it has been laundered.	A	29
25. In selecting clothes to put on when you dress in the morning, you should think only about their appearance.	D	82
26. Deodorants which stop perspiration are undesirable.	A	31

Statement	*Key*	*Per cent of Correct Answers*
27. A child does not need to go to bed at a regular time each night, so long as he averages ten or twelve hours of sleep each day.	D	69
28. Being able to get along on about five hours' sleep each night is a sign of intelligence.	D	92
29. Even if sleep-producing drugs were harmless, they should never be used (except by prescription) because sleep should come naturally.	A	83
30. A child should play exciting games just before bedtime in order to make him sleep soundly.	D	81
31. A drunken driver should not have his license permanently taken away.	D	47
32. A person should always cover his face when coughing or sneezing.	A	93
33. Every child should be vaccinated against smallpox before one year of age.	A	35
34. In a big city all dogs should receive inoculations against rabies.	A	80
35. Everyone should have some knowledge of the nature and mode of spread of communicable diseases.	A	90
36. All free clinics for the diagnosis of cancer should be closed.	D	78
37. A person who has tuberculosis should let no one else know about it.	D	86
38. A high school course in health should include some instruction in first aid.	A	94
39. Ideally the health department should leave all health problems to the local physicians.	D	75
40. A person should be entirely responsible for his own health.	D	38
41. Skin sores or cuts should be covered with a clean pocket handkerchief if no sterile bandage is available.	A	64
42. A cold does not always need immediate attention.	D	83
43. Schools should furnish health examinations to discover the need for medical care.	A	88
44. Constant indigestion should be cause for a medical examination.	A	87
45. Every person during high school should have a health examination with special attention to any signs of tuberculosis.	A	87
46. An athlete should be given a health examination at the beginning of each sports season in which he participates.	A	96
47. Adults do not need regular health examinations.	D	92
48. An individual should make a definite attempt to break nervous habits like biting the fingernails.	A	96
49. The way you feel always tells you the right thing to do.	D	63
50. Everyone should check his health practices from time to to time and keep them at a high level.	A	89
51. If we could obtain the necessary information, we would very likely find that the use of alcohol even in moderate quantities has the same effect on everyone.	A	29

Statement	Key	Per cent of Correct Answers
52. Even though very exact records were kept by two people on how tobacco affects them, they would probably find that they were affected in different ways.	A	74
53. Reducing substances should be bought only when prescribed by a physician.	A	93
54. Pain is really part of nature's plan; therefore, one should never buy and use any sedative or pain-killer without a physician's prescription.	A	66
55. Manufacturers of patent medicines should not be allowed to claim results they cannot prove.	A	86
56. Any person should be refused a permit to drive an automobile if he fails to pass a careful physical and driving examination.	A	84
57. A high school boy or girl should learn to play at least one sport reasonably well and with enjoyment.	A	90
58. The fire department should inspect homes for fire hazards.	A	82
59. Usually a driver should be allowed to pass another car going in the same direction up a hill, with a clear vision for 300 feet ahead.	A	23
60. One should avoid using a public drinking fountain at which the water falls back onto the bubbler.	A	84
61. A clear sparkling water is always pure and safe.	D	76
62. The best time to start killing flies is in the fall before the eggs are laid.	D	18
63. All dishes in restaurants and soda fountains should be washed in water at or near the boiling point.	A	91
64. A kitchen should have dark walls and floors so as not to show dirt.	D	94
65. Airplanes flying from foreign countries should be inspected and thoroughly sprayed to kill insects.	A	75
66. A severe penalty should be imposed by law on the individual who runs his motor unnecessarily in a public garage.	A	50
67. A deep-sea diver should be allowed to work under high pressure as long as he wishes.	D	86
68. All factories and offices should provide facilities for administering first aid.	A	96
69. A local board of health should not publish reports on the prevalence of communicable disease in the community.	D	80
70. A man should be hired for a job without being forced to have a medical examination.	D	72
71. Everyone who treats disease should meet the same educational requirements.	A	44
72. Every city should make laws to prevent crowded living conditions.	A	89
73. In the larger cities there should be health museums for health education of the public.	A	82
74. All health articles appearing in magazines and newspapers are safe health information.	D	76
75. Everyone should be acquainted with the activities of his local health department.	A	89

Statement	Key	Per cent of Correct Answers
76. Picnic grounds should be supervised by the public health department.	A	90
77. A public library would be justified in having on its shelves a book entitled: "Cancer: What Everyone Should Know About It," recommended by The American Medical Association.	A	76
78. The health of the people would be improved if the public were educated to a better selection of food.	A	81
79. The school teacher should not bother about children's ability to see well.	D	95
80. A person who is hard of hearing should learn to read lips.	A	57
81. A person with athlete's foot should be allowed to use a public swimming pool.	D	85
82. Every high school pupil should take a course of instruction in health.	A	83
83.. All teachers should be given a health examination before being employed.	A	85
84. Because pasteurizing milk is an artificial process, the process of pasteurizing makes milk less desirable than raw (unpasteurized) milk	D	65
85. If people are willing to take the risk, they should be permitted to buy meat that has not been inspected.	D	91
86. Laws regulating the quality of meat used in making frankfurters are unnecessary.	D	76
87. Any person knowingly buying unpasteurized milk in a locality where pasteurizing is required, is as much to blame as the person selling such milk.	A	80
88. The workers in eating places and soda fountains should receive special training in the sanitary handling of food.	A	93
89. If a worker is sick for a few weeks, he should lose his wages for the time he is away from work.	D	76
90. A city should collect and dispose of household garbage.	A	96

SUMMARY OF RESULTS ON A STATE-WIDE BASIS

Average	73.95
Standard deviation	9.68
Range of scores	22-93
Total number of pupils taking test	9535

TEST IV

YOUR CHOICE, PLEASE!

Directions: We want to know if you would be interested in the scientific facts behind some of the following questions. Read each question carefully, and in the blank on the answer sheet corresponding to the number of the question, blacken the space:

1. Under I (Interesting) if *you* are *interested* in the question and would like to study about it in school.

2. Under U (Uninteresting) if the question holds little or *no interest* for *you.*

Do not try to answer the questions, just indicate whether each is interesting or uninteresting to you.

Examples:

		I	U
1. How does health influence one's ability to get a job?	1.	|	||
2. What are the names of all the bones in the skull?	2.	||	|

Questions	*Per Cent of Pupils Interested*
1. Are pimples caused by poor digestion?	74%
2. How can one break a habit like biting the fingernails?	50
3. Can the skin absorb such things as vanishing cream, alcohol, etc?	53
4. How can bashfulness be overcome?	61
5. Does nail polish make the fingernails brittle?	36
6. How can "athlete's foot" be avoided?	67
7. What is the safest way to remove superfluous hair?	41
8. What are the duties of a public health department?	55
9. Is massaging good for the scalp?	76
10. Can dandruff be removed permanently?	81
11. What is this thing called "personality"?	80
12. Can discolored teeth be whitened without injury to the enamel?	78
13. What effect does emotional stimulation have upon body odor?	58
14. Does the use of deodorants cause serious skin irritation?	53
15. How should one select a physician?	58
16. How is color-blindness inherited?	44
17. Should adults supplement the regular diet with cod liver oil or vitamin capsules?	30
18. Is the skipping of meals injurious to one's health?	64
19. Does one get sufficient vitamins in the ordinary diet?	59
20. Is it true that certain vegetables or fish should not be eaten at the same meal with milk?	52
21. Should one pay attention to the amount of vitamins in the diet?	58
22. Is buttermilk good for putting on weight?	31
23. Is fish a brain food?	35
24. Is there any danger in allowing food to stay in an opened can for several days?	62
25. Should one eat fried foods?	54
26. How much can one rely upon the information given in food advertising on the labels of food products?	58
27. What types of food should an athlete eat?	59
28. Is it necessary to eat sea food occasionally to insure that a sufficient amount of iodine is being taken into the body?	59
29. What food deficiency diseases (pellagra, rickets, etc.) are most likely to result from the diet restrictions imposed upon the civilian populations of Europe?	52
30. Is there any danger of becoming poisoned by eating fruits and vegetables that have been sprayed with arsenic?	72
31. Is it dangerous to eat oysters during some months of the year?	43
32. How does bicarbonate of soda or a similar substance affect digestion?	50
33. Is constipation dangerous if a person is healthy in other respects?	59
34. What is health insurance?	56
35. Are the recommended health activities based upon scientific facts?	53

Questions	*Per Cent of Pupils Interested*
36. What substances needed by the body are lost through perspiration?	59
37. What is the best way to prevent colds?	85
38. How does it happen that colds often lead to more serious diseases?	76
39. How do germs gain entrance to the body?	70
40. Is the exhaust from automobiles on the streets of crowded cities dangerous to health?	58
41. Is it healthful to have the windows wide open when sleeping, no matter what the temperature is outside?	70
42. What is the proper temperature and humidity for a school classroom or home?	58
43. Is it harmful to be a blood donor?	64
44. Can an older person regain his youthful vigor by means of hormone preparations?	31
45. What causes hardening of the arteries?	53
46. How can one prevent heart disease?	69
47. What relation has diet and the use of salt to high blood pressure?	47
48. What are the dangers of using thyroxin (thyroid hormone) for reducing?	34
49. Are people who take a great deal of exercise likely to die young?	61
50. Does strenuous exercise strain the heart?	77
51. How much sleep should a person get?	69
52. Will drinking coffee before bedtime keep a person awake?	44
53. Why do most people weigh more when they are 40 years of age than when they are 25 years of age?	48
54. What kind of dangerous parasites or bacteria are most commonly found in food?	52
55. Will exposure to strong sunlight kill many harmful bacteria?	57
56. Do throat sprays and lozenges have any protective effect against "flu" and colds?	60
57. What happens when one is inoculated or vaccinated against a disease?	65
58. Are cold vaccines of any value in the prevention of colds?	60
59. Does climate influence one's health?	70
60. What is the best way to treat a severe bruise?	76
61. Will violet rays and sun lamps build up one's resistance to colds and other diseases?	54
62. Are the advertised throat antiseptics and cold remedies of any value?	50
63. Does smoking affect one's health?	62
64. Is a coat of tan healthful?	79
65. How can a person distinguish between beneficial patent medicines and useless and harmful ones?	67
66. Of what value is the Federal Food and Drug Act in controlling the advertising of patent medicines?	57
67. What is a "balanced diet"?	56
68. What does "pasteurization" do to milk?	57

Questions	*Per Cent of Pupils Interested*
69. What is the effect of massaging on the muscles?	59
70. What is allergy, and what are some of the more common allergies?	39
71. Why are some diseases placed under quarantine while others are not?	54
72. Can some people carry disease germs and at the same time remain healthy?	68
73. Are there any rules which hikers should follow in traffic on a country road?	54
74. How can fainting be avoided?	59
75. How can one stop arterial bleeding?	76
76. Should one wait after a meal before going swimming?	62
77. What are the characteristics of a good water supply?	64
78. Is there a simple and safe way for a traveler or camper to make doubtful drinking water pure?	75
79. Can one use a public drinking fountain with safety?	65
80. How do cities dispose of sewage?	42
81. How is the problem of waste disposal related to the control of fly-breeding?	42
82. Does smoke from chimneys influence health?	47
83. Do bacteria help in the disposal of sewage?	41
84. What has been the role of rats in the history of the world?	44
85. Where would you be able to get a copy of your birth certificate?	48
86. Why do schools give each pupil a health examination?	64
87. What are some of the hazards in industry, and how can they be avoided?	58
88. What are the regulations governing child labor, and why are such laws necessary?	65
89. What is the best way to eliminate mosquitoes?	66
90. Do poor housing conditions affect health?	67

In the blank space on the answer sheet write some questions which are *not* listed in this test, and which you especially would want to study in a health course.

Total number of pupils taking test 9535

TABLE I

CLASSIFICATION OF HEALTH QUESTIONS ASKED BY HIGH SCHOOL PUPILS IN HEALTH INTERESTS TEST

Personal Hygiene

Nutrition	190	Rest and Fatigue	75
Posture and Exercise	233	Skin	364
Cleanliness	27	Elimination	26
Fresh Air and Sunshine	30	Chronic Diseases	100
Care of the Hands	36	Acute Diseases	188
Care of the Eyes	81	Medical Advice	1339
Oral Hygiene	120	Medical Examinations	1
Care of the Hair	190	Mental Health	166
Care of the Feet	63	Body Weight and Height	128
Care of the Ears, Nose, and Throat	22	Alcohol	68
Clothing	23	Tobacco	104
		Drugs and Self-medication	56

Climate	27	Dust and Dirt	4
Heredity	47	Bacteria	17
Social Hygiene	76	Industrial Hygiene	31
First Aid	70	Public Health Administration	2
Heat and Ventilation	14	Public Health Law	4
Vocational Guidance	14	Vital Statistics	11
Community Hygiene		Public Health Education	19
Safety	4	School Health	33
Sanitation	31	Foods and Food Handling	25
Water	13	Housing	9
Waste Disposal	5		
Animals, Rodents, and Insects	21	Total	4107

BIBLIOGRAPHY

American Council on Education, *Health Inventory:* Chicago Cooperative Study. (Washington, District of Columbia: American Council on Education, 1940).

Byrd, Oliver E., *Byrd Health Attitude Scale* (Stanford, California: Stanford University Press, 1940).

Conrad, Howard L., "The Construction of Health Knowledge Tests," *The Journal of Health and Physical Education,* IX: 10 (December, 1938), pp. 620-621+.

Forsythe, Warren E., and Mabel E. Rugen, "Health Knowledge Test," *Research Quarterly,* VI: 2, (May, 1935), pp. 105-120.

Gates, Arthur I., and Ruth Mae Strang, *The Gates-Strang Health Knowledge Tests:* Forms D, E, and F (New York: Columbia University, Teachers College, Bureau of Publications, 1938).

Kilander, Holger Frederick, *Kilander Health Knowledge Test* (Upper Darby, Pennsylvania: H. F. Kilander).

Latimer, Jean V., "Health Education Status of High School Pupils and Need for Coordinated School Health Programs," *Journal of the American School Health Association,* XIII: 1 (January, 1943), pp. 1-8.

Mooney, Ross L., *Problem Checklist*: High School Form (Columbus: Ohio State University, Bureau of Educational Research).

Moore, Frederika, and William E. Cottle, *Test of Health Consciousness* (Boston: Massachusetts Department of Public Health).

Southworth, Warren H., "Testing Techniques and Procedures Employed in the Massachusetts Study of Health in Senior High Schools," *Journal of the American School Health Association,* XII: 10 (December, 1942), pp. 311-318.

Trusler, V. T., C. E. Arnett, and H. E. Schrammel, *Health Knowledge Test* (Emporia, Kansas: Kansas State Teachers College, Bureau of Educational Research).

Turner, Clair E., *Principles of Health Education* (New York: D. C. Heath and Company, 1939). P. xvi, 335.

Turner, Clair E., and Elizabeth McHose, *Effective Living* (St. Louis: Mosby Company, 1941). P. x, 423.

Turner, Clair E., "Significant Findings of the Massachusetts High School Study and Their Implications for Health Education Programs," *Journal of the American School Health Association,* XIII: 1 (January, 1943), pp. 9-17.

The Measurement of Capacities for Learning Dance Movement Techniques

By Rachel Jane Benton
University of Maryland
College Park, Maryland

THERE have been many investigations dealing with the problem of capacities for learning motor skills as related to sports and track activities. In dance, however, very little of this type of measurement has been attempted.

By dance movement is meant the basic skills in movement necessary for dance. The term "dance," in this study is synonymous with "modern dance."

THE PROBLEM

This study was an attempt first to measure the capacities of college women for learning skill in the movement techniques of dance in terms of ability to perform these techniques after a relatively homogeneous period of instruction, and second, to set up batteries of tests which would predict this skill accurately.

Let it be clearly understood that this investigation does not deal with the creative aspect of the dance. Rather than to try to test such qualities as artistic temperament, emotional response, and idea projection, an attempt was made to measure the movement techniques considered as motor skills basic to dance.

SURVEY OF THE LITERATURE

Research reported by Annett,*[1] Lemon and Sherbon,[8] Heinlein,[5] McCristal,[13] and Shambaugh[16] dealt largely with a study of the subject's motor response to a rhythmic pattern. Tests used in these studies included the Seashore Sensory Rhythm Test,[14] the Seashore Motor Rhythm Test,[15] and original tests for rhythmic ability devised by the author.

The present study deals not only with rhythm, but with the other factors considered basic to dance movement techniques.

PROCEDURE

A group of forty-two majors in physical education acted as subjects in selected dance movement techniques and rated the ability of instruction from the same teacher and performance in class projects

---

An abstract of a thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, State University of Iowa, 1942.
* Numbers refer to bibliography at end of article.

and recitals. The formal classwork varied from seven to fourteen weeks.

The three instructors in physical education who acted as judges were all experts in the field of dance. These judges observed the subjects on selected dance movement techniques and rated the ability of each subject on a six-point scale ranging from "exceptional" to "extremely poor." The intercorrelations of these ratings are shown in Table I.

TABLE I

INTERCORRELATIONS OF JUDGES' RATINGS*

	Judge No. 2	Judge No. 3
Judge No. 1	.6934	.5014
Judge No. 2		.5783

The average intercorrelation, stepped up by the Brown-Spearman formula, would indicate a general reliability of approximately .81 for the sum of the three ratings.

Because it seemed impossible for the author to devise valid tests for them, no attempt was made to measure kinesthetic sense, emotional response, and artistic qualities. Fifteen tests were selected for experimentation.

ANALYSIS OF THE DATA

All tests were correlated with the criterion which was the sum of the three judges' scores for each subject. The measures showing the highest positive correlation with this criterion and selected for use in the prediction equations were:

1. A weighted battery of five items of the Johnson-type test, [7,2] described in the Appendix. (Motor educability).
2. The sum of six items of the Brace-type test,[4, 11] described in the Appendix. (Motor educability).
3. The Physical Fitness Index, using McCloy's scoring[12] (Strength relative to weight).
4. The Bass Static Balance Test (crosswise).[3] (Balance).
5. The Bass Dynamic Balance Test.[3] (Balance).
6. The Seashore Series A Rhythm Test.[14] (Sensory rhythm).
7. The Seashore Motor Rhythm Test.[15] (Motor rhythm).
8. Sierakowski's Left Boomerang Test.[17] (Agility).

These tests were then intercorrelated. (Refer to Table II.) The Dynamic Balance Test was discarded as being of little value because the partial correlation of the criterion with Dynamic Balance, holding Static Balance constant, was very low, (.031) and the multiple cor-

* All correlations in this paper are given in terms of four decimal places. We realize, of course, that this represents a spurious degree of accuracy. However, because of the possibility of introducing further errors of rounding off in the process of computing partial and multiple correlations of the sixth and seventh order, it is our practice to compute to four places. We are publishing them so that anyone wishing to check computations will have access to our original correlations as we used them.

relation of Dynamic Balance and Static Balance against the criterion indicated that Dynamic Balance contributed nothing significant that was not already found in the other seven variables. The multiple correlation of the criterion with the remaining seven variables was computed and found to be .8373.

Other multiple correlations were computed by the Doolittle method. Experimentation was carried out by successively eliminating the item with the lowest data score. The first four regression equations in Table III show these results.*

The fifth regression equation shown in Table III was computed omitting the Physical Fitness Index. This proved to give a 20 per cent less accurate prediction, however.

SUMMARY OF RESULTS

1. What qualities are most important in dance movement techniques? Most of the zero order correlations in this study were low, with the highest values ranging from .2259-.6464 as shown in Table IV. In the selection of subjects for this study it was not feasible to choose the best and the poorest in skills because of the need to keep the practice element constant. This narrowed range resulted in lower values of the zero order correlation coefficients than would have been the case in a group of subjects with a wider range of skills. The significance** of any of the zero order correlation coefficients, however, is not a necessary consideration here, since the conclusion may be drawn from an anlysis of the data, that dance skill is made up of a combination of several elements, and is not dependent upon any single quality.

2. The low intercorrelation (Table II) indicates the independence of the qualities which these tests are an attempt to measure. It can be further pointed out that these results would seem to show that if a dancer lacks any of these elements she would not be a good dancer.

3. Dance movement is not entirely rhythm. The results of this investigation seem to show that other elements such as balance, motor educability, agility, and strength are important.

4. Knowing what qualities make up the technique skills of a good dancer, anyone who might wish to improve her techniques could well concentrate on developing these qualities. From the standpoint of teaching, any given degree of innate educability being constant, bet-

* It should be pointed out that these coefficients of validity are as high as the probable reliability of the criterion ratings—a fact which would indicate that, were these correlations with the criterion to be corrected for attenuation, the validities' coefficients would be much higher.

** Lindquist (9, p. 212) gives the value of the correlation coefficient required for significance for the number of subjects used in this study as .304 at the 5 per cent level, and .393 at the 1 per cent level of confidence.

ter instruction will result in a greater degree of learning.

5. The multiple correlation coefficient value might conceivably be as high as .95 since correcting for attention on the judges' ratings resulted in a correlation of .93. If the tests were given several times the correction for attenuation would raise the zero order value of the correlation coefficients.

6. The multiple regression equations may be used to predict the probable skill in dance movement techniques when the subject's scores on the separate test factors in the equations are known. This prediction is based on the reasoning that if a subject who has had no experience or training in dance, scores high on these tests, she has the capacities for learning skill in dance movement techniques. A practical application may be suggested in the use of any of these test batteries in advising students entering physical education activities, or in advising students who major in physical education regarding specialization in dance.

7. Five weighted combinations of tests are presented as batteries for predicting skill in dance movement techniques.*

CONCLUSIONS

On the basis of the results of this study the following conclusions might be drawn:

1. Capacities for learning skill in dance movement techniques after instruction may be measured with fair accuracy by appropriate tests readily available.

2. Although no single measure is of value in predicting this skill, a combination of several tests will show a high relationship with criterion ratings of dance movement techniques.

TABLE II

INTERCORRELATION COEFFICIENTS

Dynamic Balance	1		
P. F. I.	2		
Static Balance	3		
Left Boomerang	4		
A-Series Rhythm	5		
Motor Rhythm	6		
Johnson Battery	7		
Brace Battery	8		

$r12$ =	.0373	$r26$ =	.0992	$r46$ =	.0519
$r13$ =	.5555	$r27$ =	—.0450	$r47$ =	.4127
$r14$ =	.0471	$r28$ =	.0926	$r48$ =	.3084
$r15$ =	—.0307	$r34$ =	.3124	$r56$ =	.1684
$r16$ =	.0655	$r35$ =	.—.0307	$r57$ =	.2531
$r17$ =	.3080	$r36$ =	.1151	$r58$ =	—.0615
$r23$ =	.0784	$r37$ =	.2435	$r67$ =	.1875
$r24$ =	.1116	$r38$ =	.3595	$r68$ =	—.0872
$r25$ =	.0338	$r45$ =	—.0979	$r78$ =	.2876

* Tables V, VI, and VII may be used for easy computation of scores in one of these equations.

TABLE III

MULTIPLE REGRESSION EQUATIONS AND CORRELATION COEFFICIENTS

0=Criterion (judges' ratings)
1=Johnson-type Test
2=Physical Fitness Index
3=Seashore Series A Rhythm Test
4=Brace-type Test
5=Motor Rhythm Test
6=Static Balance Test

Rating* = .5593 (Johnson) + .7656 (P.F.I.)** + 1.5064 (Series A Rhythm) + 1.8129 (Brace) + 5.8893 (Motor Rhythm) + .0333 (Static Balance) — 229.9729

Rating = .5873 (Johnson) + .7996 (P.F.I.) + 1.5853 (Series A Rhythm) + 1.5984 (Brace) + .0371 (Static Balance) — 240.289

Rating***= .6206 (Johnson) + .8226 (P.F.I.) + 1.532 (Series A Rhythm) + 2.023 (Brace) — 242.4925

Rating = .7103 (Johnson) + .884 (P.F.I.) + 1.3374 (Series A Rhythm) — 238.5643

Rating = .5098 (Johnson) + 2.1657 (Brace) + 1.608 (Series A Rhythm) + .0372 (Static Balance) + 7.658 (Motor Rhythm) — 220.3571

R_o .123456 = .8366† R_o 123 = .7850

R_o .12346 = .8280 R_o 14365 = .7744

R_o .1234 = .8147

*Rating score is in terms of T-score units.

**P.F.I. refers to Physical Fitness Index.

***Tables V, VI, and VII may be used for computation of this equation.

†When the ratings were corrected for attenuation the multiple correlation was .93.

TABLE IV

TEST DATA

Tests	*Correlation with Criterion*	*Mean*	*Standard Deviation*	*Reliability as found in Literature*
Left Boomerang	.3516	20.35 sec.	1.16 sec.	.91
Static Balance (crosswise)	.3667	178.1	100.8	.8—.9
Dynamic Balance	.2259	67.62	15.02	.95
Brace-type Battery	.3983	7.88	2.65	.71
Johnson-type Battery	.6464	170.12	19.7	.97
Series A Rhythm (Seashore Measures of Musical Talents)	.4011	51.81	4.09	.62
Motor Rhythm	.2916	2.22 mm.	.501 mm.	.89
Physical Fitness Index	.3536	111.36	9.78	.86—.92

TABLE V

COMPUTATION OF SCORE ON JOHNSON-TYPE TEST

10 (Stunt 2) + 5 (Stunt 4) + 3 (Stunt 9) + 1 (Stunt 13) + 2 (Stunt 15)

Score on Johnson-type items	Stunt Number 2	4	9	13	15
10	100	50	30	10	20
9	90	45	27	9	18
8	80	40	24	8	16

7	70	35	21	7	14
6	60	30	18	6	12
5	50	25	15	5	10
4	40	20	12	4	8
3	30	15	9	3	6
2	20	10	6	2	4
1	10	5	3	1	2

Explanation: Locate the score of the stunt in the extreme left column. Follow this row across to the right until it meets the column headed by the number of that stunt. Follow this procedure for each of the five stunts, then add these results to get the score on the Johnson-type Test to be used in the prediction battery.

TABLE VI

COMPUTATION OF SCORE ON JOHNSON-TYPE TEST AND PHYSICAL FITNESS INDEX

.6206 Johnson + .8226 P.F.I. — 180

Weighted Johnson-Type Test Score	Physical Fitness Index											
	85	90	95	100	105	110	115	120	125	130	135	140
210	20	24	28	33	37	41	45	50	53	57	61	65
205	17	21	25	30	34	38	42	46	50	54	58	62
200	14	18	22	26	30	35	39	43	47	51	55	59
195	11	15	19	23	27	32	36	40	44	48	52	56
190	8	12	16	20	24	28	33	37	41	45	49	53
185	5	9	13	17	21	25	29	34	38	42	46	50
180	2	6	10	14	18	22	26	30	35	39	43	47
175	-1	3	7	11	15	19	23	27	31	36	40	44
170	-5	-1	4	8	12	16	20	24	28	32	37	41
165	-8	-4	1	5	9	13	17	21	25	29	33	38
160	-11	-7	-3	2	6	10	14	18	22	26	30	34
155	-14	-10	-6	-2	3	7	11	15	19	23	27	31
150	-17	-13	-9	-5	1	4	8	12	16	20	24	28
145	-21	-17	-12	-8	-4	1	5	9	13	17	21	25
140	-23	-19	-15	-11	-7	-3	1	6	10	14	18	22
135	-26	-23	-18	-14	-10	-6	-2	2	7	11	15	19
130	-29	-25	-21	-17	-13	-9	-5	1	4	8	12	16

Explanation: If an individual gets a score of 180 on the Johnson-type Test and a score of 100 on the Physical Fitness Index, find the score of 180 in the extreme left column. Follow this row across to the column headed 100. At this intersection is the combined score of these two tests to be used in the predictive battery. This score as found in Table VI should be added to the score of Series A Rhythm Test and the Brace-type Test as determined in Table VII.

TABLE VII

COMPUTATION OF SCORE ON BRACE-TYPE TEST AND SERIES A RHYTHM TEST

1.532 Series A Rhythm + 2.023 Brace -60

Series A Rhythm Test Score	Brace-type Test Score*									
	3	4	5	6	7	8	9	10	11	12
60	38	40	42	44	46	48	50	52	54	56
58	35	37	39	41	43	45	47	49	51	53
56	32	34	36	38	40	42	44	46	48	50
54	29	31	33	35	37	39	41	43	45	47
52	26	28	30	32	34	36	38	40	42	44
50	23	25	27	29	31	33	35	37	39	41
48	20	22	24	26	28	30	32	34	36	38
46	17	19	21	23	25	27	29	31	33	35
44	13	16	18	20	22	24	26	28	30	32
42	10	12	14	16	19	21	23	25	27	29
40	7	9	11	13	15	17	19	22	24	26

This table is read in the same manner as Table VI.

*Sum of the six Brace-type stunts described in the Appendix.

APPENDIX

JOHNSON-TYPE TEST

Exercises numbered 2, 4, 9 of the Johnson Test plus the following were chosen for use in the final prediction batteries.

Frog Jump: Barton [2] (Exercise No. 13 in this study). Start with both feet on first center target and both hands on second center target. Jump so that feet land between hands on second center target. While feet remain on second center target reach forward and place both hands on third center target. Continue thus across mat.

Scoring: Deduct one point from the score for each jump in which the subject oversteps a target, or in which she does not have both hands (at least the thumb) on the target, or in which she does not place her feet between her hands. Deduct one point for lack of rhythm.

Back Hop (Exercise No. 15 in this study): Hands on hips. Start with back to left lane. Hop backward landing on right foot in first white square in left lane. Hop backward landing on both feet in first black square in left lane. Hop diagonally backward landing with left foot in second white square in right lane. Hop backward landing with both feet in second black square in right lane. Continue across mat, finishing with both feet in last center target.

Scoring: Deduct one point from score for each hop or jump in which the foot oversteps the square, for each jump when the feet do not land at the same time, or if hands are removed from the hips. Deduct one point if rhythm is not maintained.

BRACE-TYPE TEST STUNTS

Those used in the prediction batteries are indicated.

1. Cross leg squat. Brace No. 17.
2. One knee—head to floor. Iowa Brace No. 9.
3. Kneel, jump to feet. Brace No. 16.
4. The top. Iowa Brace No. 19.
5. Sit, stand, Barton No. 14.[2] Sit on the floor. Place the right foot close to the body, knee bent. Stand up on right foot without assistance from

the hands or left foot. It is a failure to be unable to stand up or to assist with hands or left foot.

6. Bear walk. From a standing position with the feet one to one and one-half feet apart, bend forward and place hands flat on the floor. Keep knees straight and walk on all fours at least ten feet. It is a failure to bend knees, not to walk ten feet, not to put hands flat on floor, not to keep feet flat on floor, to spread feet apart more than one and one-half feet.

BIBLIOGRAPHY

1. Annett, Thomas, "A Study of Rhythmical Capacity and Performance in Motor Rhythm in Physical Education Majors," *Research Quarterly*, 3:2 (May, 1932), 183-191.

2. Barton, Gertrude, *A Comparative Study of Brace-Type and Johnson-Type Tests as Measures of Motor Educability in Junior High School Girls*, master's thesis, State University of Iowa, 1935.

3. Bass, Ruth I., *An Analysis of the Components of Tests of Semi-Circular Canal Function and of Static and Dynamic Balance*, unpublished doctor's thesis, State University of Iowa, 1938.

4. Brace, Davd K., *Measuring Motor Ability* (New York City 18: A. S. Barnes and Company, 1927).

5. Heinlein, C. P., "A New Method of Studying Rhythmic Responses of Children Together with an Evaluation of the Method of Simple Observation," *Journal of Genetic Psychology*, 26:2 (June, 1929), 205-229.

6. H'Doubler, Margaret, *Dance: A Creative Art Experience* (New York: F. S. Crofts and Company, 1940).

7. Johnson, Granville B., "Physical Skill Tests for Sectioning Classes into Homogeneous Units," *Research Quarterly*, 3:1 (March, 1932), 128-142.

8. Lemon, Eloise, and Elizabeth Sherbon, "A Study of the Relationship of Certain Measures of Rhythmic Ability and Motor Ability in Girls and Women," *Research Quarterly*, Supplement, 5:1 (March, 1934), 82-85.

9. Lindquist, E. F., *Statistical Analysis in Educational Research* (New York: Houghton Mifflin Company, 1940).

10. Martin, John, *The Modern Dance*, (New York City 18: A. S. Barnes and Company, 1933).

11. McCloy, C. H., "An Analytical Study of the Stunt Type Test as a Measure of Motor Educability," *Research Quarterly*, 8:3 (October, 1937), 46-56.

12. ———, *Tests and Measurements in Health and Physical Education*, (New York: Crofts and Company, 1939).

13. McCristal, K. J., "An Experimental Study of Rhythm in Gymnastics and Tap Dancing," *Research Quarterly*, 4:2 (May, 1933), 63-75.

14. *Seashore Measures of Musical Talent*, Educational Department of R. C. A. Manufacturing Company, Camden, New Jersey.

15. Seashore, R. H., *Stanford Motor Skills Unit*, Psychological Monographs, University of Iowa, 39:2, 1928.

16. Shambaugh, Mary Effie, "The Objective Measurement of Success in the Teaching of Folk Dancing to University Women," *Research Quarterly*, 6:1 (March, 1935), 33-59.

17. Sierakowski, Frances, *A Study of Change-of-Direction Tests for High School Girls*, master's thesis, State University of Iowa, 1940.

An Assessment of the Validity of Height—Weight Class Divisions for High School Girls

By Karl W. Bookwalter
Indiana University
Bloomington, Indiana

VARIOUS studies by Humiston; Cozens, Cubberly, Neilson; and others have revealed the inadequacy of age, height, and weight in combination or singly for the classification of secondary school girls and college women. There is, however, a need for some economical yet effective classification for girls.

The present study proposes to evaluate the effectiveness of height-weight class divisions in the discrimination of physical fitness of high school girls. The study does not propose to adjudge the merits of the criterion test but accepts its score of physical fitness as measured.

The Classifier.—The classification scheme employed herein utilizes the simple technique evolved by Cozens[1] for college men. The upper 25 per cent of the height distribution is designated as tall. The middle 50 per cent is designated as medium in height and the low 25 per cent are designated as short. The weight distribution for each inch of height is similarly divided into the heavy 25 per cent, the medium-weight middle 50 per cent, and the lowest 25 per cent who are indicated as slenders. In this manner there are formed nine groups each relatively homogeneous for height and weight. They will be designated as short slender (S.S.), short medium (S.M.), short heavy (S.H.), medium slender (M.S.), medium medium (MM.). medium heavy (M.H.), tall slender (T.S.), tall medium (T.M.), and tall heavy (T.H.). Table I shows the limits of these divisions.

1 Frederick W. Cozens, *Achievement Scales in Physical Education Activities for College Men.* (Philadelphia: Lea and Febiger, 1936.) pp. 7-9.

TABLE I

Height-Weight Class Divisions of Secondary School Girls*

	Height		*Weight*		
	Feet and Inches	*Inches*	*Slender*	*Medium*	*Heavy*
	4-7	55	up to 82	83 - 111	112 up
	4-8	56	up to 79	80 - 102	103 up
	4-9	57	up to 82	83 - 107	108 up
Short	4-10	58	up to 85	86 - 110	111 up
	4-11	59	up to 91	92 - 112	113 up
	5-0	60	up to 96	97 - 117	118 up
	5-1	61	up to 99	100 - 120	121 up

	5-2	62	up to 103	104 - 124	125 up
Medium	5-3	63	up to 106	107 - 127	128 up
	5-4	64	up to 110	111 - 132	133 up
	5-5	65	up to 113	114 - 136	137 up
	5-6	66	up to 116	117 - 140	141 up
	5-7	67	up to 120	121 - 143	144 up
Tall	5-8	68	up to 120	121 - 152	153 up
	5-9	69	up to 126	127 - 153	154 up
	5-10	70	up to 125	126 - 154	155 up
	5-11	71 up	up to 124	125 - 160	161 up

Directions: Read down the height column until the girl's height is reached. Next read to the right to the weight column containing the girl's weight for that height. Her classification is the height group and weight group combined. (Example: A girl whose height is 65 inches and whose weight is 137 is a Tall Heavy (TH).

* Calculations, courtesy of C. Wesley Dane, Instructor, Indiana University. Data (19,000 cases) furnished by Research Committee of the National Section on Women's Athletics, A.A.H.P.E.R.

The Criterion.—For a measure of physical fitness (motor fitness) data on the Indiana Physical Fitness Test[2] are employed. The test for girls consists of straddle chins plus squat thrust (Burpee Test, 20 sec.), plus push-ups (from knees rather than toes). The sum of these three raw scores is multiplied by the vertical jump in inches to the last half inch.

The Data.—The 1,412 cases from Indiana high schools are available through the courtesy of Frank Stafford, Chief, Division of Health and Physical Education, Indiana State Board of Health. The girls who took this test were also classified into their appropriate height-weight class divisions and the 1,412 cases are distributed as follows:

Class	S.S.	S.M.	S.H.	M.S.	M.M.	M.H.	T.S.	T.M.	T.H.
Cases	37	150	60	132	448	139	91	260	95
Actual Per Cent	2.6	10.6	4.2	9.3	31.7	9.8	6.4	18.4	6.7
Expected Per Cent	6.2	12.5	6.2	12.5	25.0	12.5	6.2	12.5	6.2

As a check on the original calculations from a nation-wide sample of 19,000 high school girls, it would appear that in general there is a reasonably distributed sampling in the present study. Specifically however the present data tend to be slightly taller than that in the national study and the present medium-medium group is a bit too large comparatively. It can be seen that the present calculations are based upon a reasonably adequate sample in each class division how-

2 This test was prepared by a committee composed of the following Indiana people: Irene Foster, Helen Hazelton, Karl W. Bookwalter, Forest Wood, and Frank Stafford, Chairman, under the direction of the Division of Health and Physical Education, Indiana State Board of Health. The test is an outgrowth of the studies, "A Measure of Motor Fitness for College Men," *Bulletin of the School of Education*, 19:2, by Karl W. Bookwalter and Carolyn W. Bookwalter; and "Further Studies of Indiana University Motor Fitness Index," *Bulletin of the School of Education*, 19:5, by Karl W. Bookwalter.

ever. The near regularity of the weight divisions for each inch further indicates the normality of the scheme.

Results.—The results obtained by classifying the test performances according to the appropriate height-weight class divisions are graphically shown in Figure 1. From this figure it can be seen that the tall-slender group has the highest average test score (79.61) and the short heavy group the lowest average test score (57.50). This difference is highly significant, having a critical ratio of 4.26. The rank order of the seven other groups according to average test scores

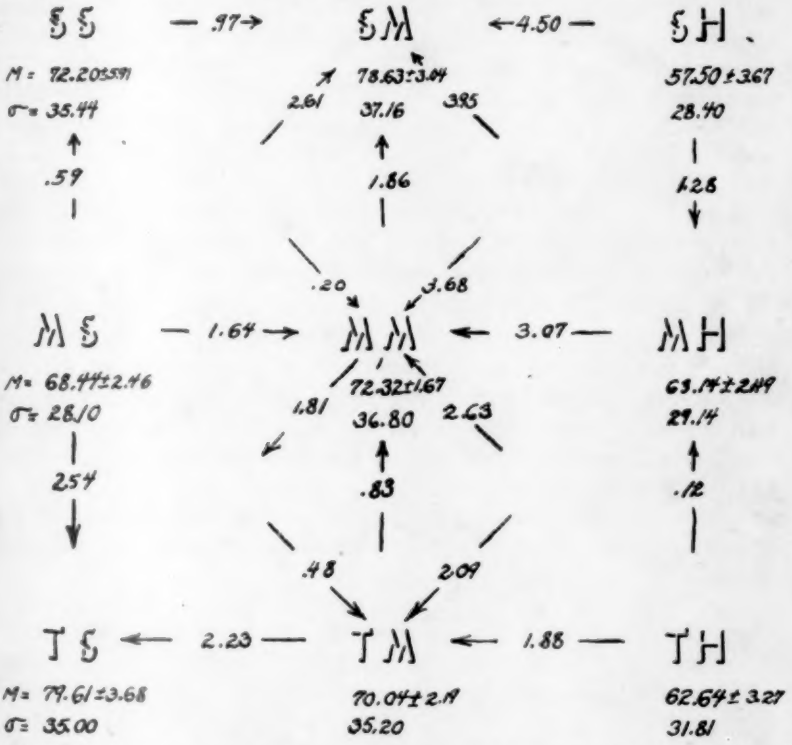


Fig. 1. Means, Standard Deviations, and Critical Ratios for Height-Weight Class Divisions of High School Girls in Indiana Motor Fitness Test.

lies in between these extremes as follows: short-medium, medium-medium, short-slender, tall-medium, medium-slender, medium-heavy, and tall-heavy. It is evidently disadvantageous to be in a heavy group regardless of height since the three heavy groups rank 9th, 7th, and 8th respectively; also in the three tall groups performance is progressively better from heaviness to slenderness. The difference between the tall-slenders and the tall-heavies is significant, having a critical ratio of 3.36. With the exception of the superior tall-slender

group it is evident that it is advantageous to be of medium weight since the short-medium, medium-medium, and the tall-medium groups rank 2nd, 3rd, and 5th respectively.

Critical ratios in the figure are inserted in arrows which point toward the higher score in each adjacent pair. This device indicates again the general superiority of the tall-slender, short-medium, medium-medium, and tall-medium groups over their adjacent groups.

With regard to the critical ratios as an index of validity of the height-weight class divisions as a classifying technique the following facts are revealed: (1) the average critical ratio of the 20 pairs of adjacent means is 1.95; (2) there are but four pairs of adjacent means with highly considerable differences, namely, SH-SM (C.R. = 4.50), MH-SM (C.R. = 3.95), SH-MM (C.R. = 3.68), MH-MM (C.R. = 3.07); (3) five pairs of adjacent means having critical ratios above 2.00 are TH-MM (C.R. = 2.63), MS-SM (C.R. = 2.61), MS-TS (C.R. = 2.54), TM-TS (C.R. = 2.23), and MH-TM (C.R. = 2.09; (4) five other critical ratios are of low significance, running from 1.88 to 1.29; (5) the remaining six critical ratios are of inconsiderable significance, running only from .97 to .12.

Summary and Conclusions.—Fourteen hundred and twelve Indiana high school girls were given the Indiana Physical Fitness Test and classified according to height-weight class divisions. These divisions were formed according to the Cozens technique for college men and based upon 19,000 cases from a nation-wide study made by the Research Committee of the National Section on Women's Athletics of the A.A.H.P.E.R.

This study accepts the criterion as a measure of physical fitness and proposes to evaluate only the validity of the height-weight class divisions.

In comparison with the normal expectancy of distribution of cases in the several height-weight class divisions, this classification places too many cases in the tall groups and in the medium-medium division. On the whole, however, the distribution of cases is workably adequate.

Judged from their ability to discriminate in a functional test, the present height-weight class divisions produce nine considerably significant critical ratios, ranging from 4.50 to 2.09, nine of low significance ranging between 1.88 and 1.28. The remaining six critical ratios are not worthy of consideration.

There is some indication from the study that differences exist between the majority of the adjacent height-weight class divisions and that a reasonably satisfactory distribution of cases can be expected in each class division.

The validity of this classification technique is not highly satisfactory but is functionally worthy of consideration. In light of other

advantages accruing from such classification and of its simplicity, its use is recommended.

Other studies are going on in which achievement scales will be available at a later date for the present Indiana test and for selected individual athletic events. These studies are justified in spite of the several insignificant differences between adjacent means because the effect of differences in variability added to differences in central tendency make for greater differences in scores beyond the middle quartiles in the achievement scales.

There is some indication that a four-fold, height-weight class division might be effective and administratively more functional.

Guide for Tracing Research in the Health, Physical Education, and Recreation Field

By Thomas Kirk Cureton
University of Illinois
Urbana, Illinois

NEED FOR TRACING THE RESEARCH LITERATURE

FIFTY-SIX institutions now offer graduate work in the field of health, physical education, and recreation which is almost three times the number offering the work ten years ago, following the Clark, Brace, the Norris and Sweet, and Hewitt surveys. In the postwar period immediately ahead leaders expect a great acceleration of graduate work in this field. With more graduate work there will be greater need to trace the research literature. Since 1885, as an official starting date of the American Association for the Advancement of Physical Education as the parent body of our present Association, a fifty-eight year period has elapsed in which a good deal of research has accumulated. This has gained such volume that it is helpful for graduate students to have some guide to assist them in searching the background of problems related to project and thesis work. Thorough-going knowledge of the literature of the field might also be considered a first essential in qualification for higher degrees.

Knowing the research literature of the field is important because it involves knowing something about the serious efforts to study the important problems which have been encountered since the work developed, many of which are not settled in final manner. A good deal of the history, program content, scientific basis, methods of teaching, and administrative procedure is reflected in the research literature. Much of the best thought and experience is formally recorded therein. As the textbooks of the field are re-written time and again, they catch up some of the outstanding work in the theses, articles, and research bulletins to make the presentation increasingly thorough and valid in light of the knowledge available. Students will always have to go back to such original sources. To know how to locate the research literature is the way to power and scholastic thoroughness on any particular problem. One never knows how good his own research is until he knows what results have been obtained by other research workers on the same problem.

The material of the health, physical education, and recreation field is widely scattered. It overlaps with several academic fields

---

A project allocated to the writer by the Research Council, National Research Section, of the American Association for Health, Physical Education, and Recreation, at the Cincinnati meeting, 1943.

and is not easy to locate without some guide. It has been rather well indexed since 1930 in the *Education Index* but a good deal appears in scientific journals not covered by this index. The card catalogs of the best libraries are woefully incomplete. There are now more than 160 published bibliographies which contain pertinent research related to the field. The great diversity of headings under which a student must search complicates the problem immeasurably. The great variety of periodicals, the variety of people working in the field, and lack of a national organization to integrate the research effort until recently add other complexities.

The great importance of understanding how to locate the diverse research materials may be comprehended in view of the following relations to scholastic work of the future:

1. Original research workers will always have to go back to the primary data for proof of principles and methods. These primary data are in the research studies.

2. Work on any advanced problem requires examining the background of the problem as it has been recorded in previous researches.

3. Comparative results may be known only as earlier results are examined.

4. Verification of originality in research can only be established by carefully looking up the previous research.

5. The ability to locate the research work and literature of the field is fundamental to advanced degree study.

PERSPECTIVE ON HOW TO LOCATE THE RESEARCH LITERATURE

It is necessary to have knowledge of the type of research work that is done and how it is published in the health, physical education, and recreation field,[1] and in supporting fields of physiology, psychology, medicine, physiotherapy, hygiene, etc. Only a small part of the research has been published in the *official channels* of the Association. The official channel would be *The Research Quarterly* (since 1930); previously the *American Physical Education Review* (1896-1929); still previously the Report of the *American Society for the Advancement of Physical Education* (1885-1895).

To make an *initial* search of current literature, one would usually proceed systematically as follows:

1. Confer with several authorities who have previously done research on the topic involved or who have made it their business to

[1] The present official title, American Association for Health, Physical Education, and Recreation, was adopted in 1937 when a merger was made between the American Physical Education Association and the Department of School Health and Physical Education of the National Education Association which had existed in various forms since 1894.

follow the research of the type involved. High spot leads to best summaries can usually be obtained rather quickly.

2. Check the current official literature in the *Education Index* and the *Research Quarterly,* working from the current date backward toward the older literature.

3. Check the *Card Catalog* (dictionary catalog) of the best library available, using the headings of the topic and also related headings of the topic from the *Dictionary Catalog of the Library of Congress*[2] and the shelf lists under the Dewey Decimal System call numbers.[3] If the card catalog is properly used, it is one of the best means. A reference librarian should be consulted with respect to the topic. The card catalog is arranged alphabetically according to topics and authors with some cross-indexing under cities, states, or countries. The cards include the call number, author, age of author, co-authors (if any), title of work, sub-title of work, place of publication, date, publisher, and very brief annotations as to bibliography contained. If the work is a thesis, the degree and college will be noted. The larger libraries usually have separate card files for theses arranged chronologically, also a separate call number catalog, and a file for new additions in suspense for filing. General works related to the field may be found under the broad headings: Physical Education and Training, Health Education, Recreation, Recreations, Athletics, Calisthenics, Hygiene, Health, Research in Education, (Specific) Sports, (Specific) Subject Fields. There are many subdivisions to these headings and many topics would not be covered by them. The topic headings should be carefully listed and the call numbers checked and listed in the Dewey and Library of Congress catalogs. No attempt is made to give the call numbers here but they may be readily found in the catalogs referred to in the footnotes.

4. Check the scientific literature that is not indexed in the education indexes, using the *Index-Catalogue* (of the Surgeon General's Office), the *Quarterly Cumulative Index Medicus, the Industrial Arts Index,* the *International Index,* and the *Psychological Index.*

5. Check the popular literature (if this seems important) in *Reader's Guide to Periodical Literature, New York Times Index, Poole's Index, Public Affairs Information Service,* and *Vertical File Service.*

6. Check the available bibliographies of published and unpublished theses and researches in the related field and send for mimeographed or printed abstracts of the related topics completed. Any particular thesis may be ordered through the inter-library loan serv-

---

2 *Subject Headings Used in the Dictionary Catalogs of the Library of Congress,* 1943.

3 Melvil Dewey, *Decimal Classifications and Relative Index,* 1942.

ice. The *Bibliographies of Research Studies in Education* will be found most helpful since 1926-27, the *Affleck Bibliographies,* and those found in the *Review of Educational Research.* Details are given on these in the remaining part of this report.

7. Check the available abstracts of research in closely related fields, such as, physiology, medicine, education, physical anthropology, child development, physiotherapy, and psychology.

8. Look up the studies which seem important, or order them through the inter-library loan service, and carefully abstract the material which seems important. These abstracts can be arranged in chronological order for summarizing. They should be taken in loose-leaf form for this purpose. Of course, the nature of many studies cannot be told with much satisfaction from the titles. The actual studies will have to be scanned.

Making a *comprehensive* search is one of the most challenging tasks in research. It will usually involve working at one of the best libraries for several months with much patient bibliography making, reading, and abstracting. All of the comprehensive guides and bibliographies of the field should be carefully used. The official channels should be exhausted first, then the supplementary sources. A schedule of work needs to be prepared, systematically followed, and checked off as it is completed. This will avoid confused groping with much lost time and duplicated effort. A comprehensive style of bibliography card and abstracting form should be adopted and used throughout the work. Much time can be saved from copying routine headings if the "fill-in" style forms are used.

SOME SUGGESTIVE HEADINGS FOR SEARCHING

Highly important in the process of library searching is the list of headings under which research may be found in the card files and in the indexes. There are many highly specialized topics which, of course, cannot be listed but the following list gives suggestions for headings under which much of the research is appearing:

Ability, also refer to performance and achievement.

Achievement, also refer to ability and performance.

Achievement Tests, a major heading under health education, physical education.

Activities, also refer to sports, games, recreations.

Activity Tests, also refer to specific activities under achievement tests.

Adipose Tissue, also refer to fat measurements, condition tests, weight analysis.

Administration, sub-heads may refer to tests or research.

Age, also refer to chronological age, physiological age, anatomical age, classification bases.

Age-Height-Weight Tables, also refer to weight, classification, norms.

Anthropometry, a principal heading in several indexes for body measurement research studies.

Appraisal, also refers to aptitude, character, personality, body type.

Aptitude Tests, also refer to particular type of appraisal.

Association, refer to statistical method.

Attitudes, refer to behavior, sportsmanship, character, personality.

Behavior, a major heading in several indexes.

Bibliographies, a major heading. Usually at back of each principal heading in the card catalog.

Body Build, also refer to constitutional type, body type, physique.

Body Mechanics, also refer to posture, flexibility, joints, physical proportions.

Buildings, also refer to gymnasia, pools, field houses, running tracks, playgrounds, fields, courts, equipment.

Character, refer to tests, appraisal, personality traits.

Circulatory, also refer to functional tests, respiratory-circulatory or circulatory-respiratory tests, cardiac, heart, cardiovascular tests.

Classification, a major heading under health, physical education and training, athletics. Also appears under particular activities.

Condition, also refer to physical fitness, training, physique, functional tests.

Constitutional Type, also refer to body type, physique, physical proportions.

Construction, refer to tests, fields, playgrounds, equipment, gymnasia, pools, instruments.

Coordination, also refer to motor ability, motor fitness, agility, balance, skill. Appears under specific activities.

Correlation, refer to statistical research methods, association, overlapping, common factors.

Diagnosis, refer to diagnostic tests, analysis of traits.

Dissertations, refer to doctors' theses.

Endurance, refer also to stamina, organic fitness, muscular endurance, circulatory-respiratory endurance.

Environmental Conditions, refer to temperature, barometric pressure, relative humidity, ventilation.

Equipment, refer also to athletic equipment, supplies, uniforms, balls, nets, racquets, apparatus, aquatic equipment, lifesaving equipment, etc.

Factors, refer to constituent elements, unitary traits, unique qualities.

Factor Analysis, refer to statistical research methods.

Fat, refer to adipose tissue, endomorphic.

Films, refer also to cinematography, moving pictures.

Flexibility, also refer to suppleness, lithe, joint movements.

General Athletic Ability (Motor Ability), refer also to criterion tests, composite tests.

Girths, see sub-head Growth, Body Build and Nutrition under major heading, Physique and Condition Tests.

Grading, see major heading, Administration of Tests and Testing Procedures.

Graphic Methods, see major heading, Construction and Statistical Procedures.

Growth, see sub-head Growth, Body Build and Nutrition under major heading, Physique and Condition Tests.

Hair, see sub-head Miscellaneous under Physique and Condition Tests.

Health, see Physique and Condition Tests; also other headings.

Height, see Physique and Condition Tests; also Classification Tests.

Information Tests, see major heading, Knowledge and Informaton Type Tests.

Interest, see sub-head under Behavior, Sportsmanship, Character and Personality Type Tests.

Inventories, see Rating Scales of Socio-Economic Status, Equipment, Environment.

Knowledge, major heading, Knowledge and Information Type Tests.

Marking, see Administration of Tests and Testing Procedures.

Maturity, see Classification Tests.

Measurement, see Administration of Tests and Testing Procedures; also, see other functional headings for special types of measurement.

Medical Examinations, see Physique and Condition Tests.

Metabolism, see Physique and Condition Tests.

Motor Ability or Control, see major heading, Achievement Tests.

Muscle, see sub-head Strength And Power, under Physique and Condition.

Nutrition, see Physique and Condition Tests.

Objective Examinations, see Knowledge and Information Type Tests.

Objectivity, see Reliability of Tests under Administration of Tests and Testing Procedures.

Observation, see Behavior, etc.; also, other functional headings which use this technique..

Overweight, see Physique and Nutrition.

Percentiles, see Construction and Statistical Procedures.

Performance, see Achievement.

Personality, see Behavior, etc.

Physical Ability, see Achievement.

Physical Development, see Physique and Condition.

Physiological Age, see Classification Tests.

Point Systems, see Administration of Tests and Testing Procedures.

Power, see Physique and Condition Tests; also, Achievement Tests.

Prediction, see Administration of Tests and Testing Procedures; also, Construction and Statistical Procedures.

Promotion, see Administration of Tests and Testing Procedures.

Puberty, see Classification Tests.

Questionnaires, see Construction and Statistical Procedures.

Rating Scales, see various forms under several sub-heads.

Records, see Administration of Tests and Testing Procedures.

Reliability, see Construction and Statistical Procedures.

Reports, see Administraton of Tests and Testing Procedures.

Research, see Construction and Statistical Procedures; sub-heads under Health, Physical, Recreation, etc.

Scales, see various types under several headings.

Scaling, see Construction and Statistical Procedures.

Size, see Physique and Condition Tests; sub-heads Growth, Body Build, and Nutrition.

Sports, see Achievement Tests, sub-heads for various sports.

Skill, see Achievement Tests, sub-heads for various sports.

Standardized Tests, see Construction and Statistical Procedures.

Standards, see Administration of Tests and Testing Procedures, Norms.

Strength, see Physique and Condition Tests.

Structure, Structural, see Physique and Condition Tests.

Surveys, see Administration of Tests and Testing Procedures.

Symmetry, see Physique and Condition Tests.

Teacher Rating, Administration of Tests and Testing Procedures.

Terminology, see Construction and Statistical Procedures.

Testing, see Administration of Tests and Testing Procedures.

Tests, see Construction and Statistical Procedures.
Texts, see Construction and Statistical Procedures.
Uses, see Administration of Tests and Testing Procedures.
Validity, see Construction and Statistical Procedures.
Values, see Administration of Tests and Testing Procedures.
Variability, see Construction and Statistical Procedures.
Vital Capacity, see Physique and Condition Tests.
Vocational, see Administration of Tests and Testing Procedures.
Weight, see Physique and Conditon Tests.

LEADING LIBRARY INDEXES AND HEADINGS FOR SEARCHING

1. The Education Index

This is the best single source to trace research in health, physical education, and recreation. There is a cumulative subject and author index to each volume. Periodicals are listed, together with much helpful information, such as publishers' addresses, names of periodicals indexed, courses of study, books, and book reviews. Subjects and authors are listed alphabetically. Paper-covered supplements are released monthly, the material being incorporated in permanently bound editions covering longer intervals.

The *Index* covers approximately 120 educational periodicals including those most prominent in relation to health and physical education, namely, the *Research Quarterly* and *Journal* of the American Association for Health, Physical Education, and Recreation (official publications), *Mind and Body,* and the *Journal* of the American Medical Association. However, a number of important periodicals are not indexed at this time of writing which contain material pertinent to the field, such as *Hygeia,* the *Athletic Journal, Scholastic Coach, Beach and Pool, American Journal of Physiology,* and the *Journal of Physical Education* (Y.M.C.A.).

The *Education Index* may be found in practically all libraries. It is published by H. W. Wilson Co., 950-972 University Avenue, New York, N. Y. Since January 1, 1929, it has been the principal index for educational literature.

2. The Ohio File

This card file index supplements the *Education Index* by indexing principally the periodicals not indexed by the *Education Index.* It is a most valuable source for research. From 1920 to 1928 it indexed all educational literature but with the start of the *Education Index* has confined itself to supplementary materials. Only two copies of this file exists, one at the Ohio State University, Columbus, Ohio, which is the original, and a duplicate at Teachers College, Columbia University, New York.

The more important headings under which research material will be found are:

3. The Index-Catalogue

This is the index to the Surgeon-General's Office Library, United States Army. It is one of the most extensive reference indexes and contains many references to research classified as (1) Functional, (2) Mental, (3) Vocational. The physical educator is interested primarily in the references of the first classification. Anthropometry is the principal heading but there is much material scattered throughout the index. Thus, tests of vital capacity are found under *lungs* or under *vital capacity*. The material is carefully indexed by subject and is arranged alphabetically.

The *First Series* begins with Vol. 1, 1880, and runs to Vol. 16, 1895. The *Second Series* begins with Vol. 1, 1896, and runs to Vol. 21, 1916. The *Third Series* begins with Vol. 1, 1918, and runs to Vol. 10, 1932, the last date of publication.

There is much material in this index having to do with physique, physical condition, or fitness research. There is little of value related to tests in sport ability or any of the activities of physical education. Medical examination material is common.

The Surgeon-General's library is one of the most extensive in this country, having at the last date of publication of the index 435,052 author titles, 361,976 book titles, 1,760,269 journal articles and 9,187 portraits. It covers most of the foreign medical publications.

4. Index Medicus, Quarterly Cumulative Index, Quarterly Cumulative Index Medicus*

Possibly this is the most important index for tracing the older anthropometrical references back as far as 1879 when this series began. Anthropometry is the heading usually employed in the medical indexes for all measurements of the human body. In the earliest numbers neither measurements nor tests are useful as headings. Beginning about 1903 the heading of Tests (mental) was adopted. There is little under this heading of significance for health and physical education.

There are six different editions of the *Index Medicus* under slightly different titles. A monthly classified record of the current medical literature of the world was begun in 1879 with Vol. 1 and ran to Vol. 21, 1898-99. The only heading is Anthropometry.

From 1900 to 1903 inclusive the *Index Medicus* was published in France in the French language only.

In 1903 the so-called *Second Series* of the *Index Medicus* began and ran 18 volumes to 1920 inclusive. This edition was published by the Carnegie Institute, at Washington, having replaced a private undertaking of the enterprise. Anthropometry is again the significant heading.

* Three successive variations of the title.

The *Third Series* began with Vol. 1 in 1921 and ran to Vol. 6, 1927. There are numerous references under Anthropometry and a few under the heading Tests.

Publication was taken over by the American Medical Association beginning with Vol. 1, 1916, and ran to Vol. 10, 1926, in a first series. A second series begins with Vol. 1, 1927, and runs to current dates, the last being July to December, 1935, Vol. 18. The publication is now issued in April, July, October, and January, with the July and January numbers cumulative, two volumes annually. The address of the publishing office is the American Medical Association, 535 North Dearborn Street, Chicago, Illinois.

5. Loyola Educational Index

The above named index is an important source for research in psychology and education. It covers, however, the cumulative indexed material for only one year, 1928. For this period it served the same purpose that the *Education Index* now serves. It was discontinued after the latter appeared. One hundred periodicals are indexed which deal with education and psychology, including some of the more significant journals publishing materials of interest in health and physical education. Headings of significance are: Anthropometry, Measurements, and Tests.

6. Miscellaneous Indexes

There are a number of other *Indexes* of minor importance from the point of view of research in health and physical education. There are descriptions of those by Alexander.

Agricultural Index
American Catalog of Books
Art Index
Book Review Digest
Document Catalog of the United States
Industrial Arts Index (Covers public and industrial hygiene)
International Index
New York Times Index
Poole's Index
Poole's Index Supplement
Psychological Index
Public Affairs Information Service (Covers public and industrial hygiene and safety)
Reader's Guide
Reader's Guide Supplement
United States Catalog
Vertical File Service Monthly

7. Government Publications Are Described or Indexed in the Following Sources:

(a) Schmeckebier, L. F., *Government Publications and Their Use,* Washington, D. C.: The Brookings Institution, 1936. Pp. 440. The agencies which publish material related to the health, physical education, and recreation field include: (1) U. S. Office of Education, Federal Security Agency, (2) Physical Fitness Division, Federal Security Agency, (3) Children's Bureau, Department of Labor, (4) Public Health Service, Federal Security Agency, (5) Surgeon General's Office, War Department, (6) Census and Statistics Bureau.

(b) 1774-1881, *Poore's Descriptive Catalogue;* 1881-1893, *Ames' Comprehensive Index;* 1893-1934, *Document Catalogue;* 1895 to date, *Monthly Catalogue, Weekly list* (since 1928).

(c) "Index of Bulletins of the Bureau of Education," Bulletin 17, 1928, U. S. Office of Education, Washington, D. C.

8. THE MOST IMPORTANT INDEX TO THE PERIODICAL LITERATURE AND FOR ALL PAMPHLETS AND SERIAL PUBLICATIONS IS:

Union List of Serials in Libraries of the United States and Canada, (2nd Edition). Edited by Winifred Gregory, New York: H. W. Wilson Company, 1943. Pp. 3065. Covers over 600 libraries, listing numbered monographs, all bulletins summarizing the progress of research and all periodicals through December 31, 1940.

DATES AND SOURCES FOR SEARCHING THE PERIODICAL LITERATURE

It is helpful to know the starting dates and years covered by indexes and periodicals covering the research literature of the health, physical education, and recreation field. Some of the more important ones as taken from the *Union List of Serials* are as follows:

Title of Periodical or Index	Previous to 1800	1800 through 1899	1900 through 1919	1920 through 1929	1930 through 1940
American Dancer				1927.....	
American Heart Journal				1925.....	
American Journal of Anatomy			1901.....		
American Journal of Hygiene				1921.....	
American Journal of Physical Anthropology			1918.....		
American Journal of Psychiatry		1844.....			
American Journal of Public Health			1911.....		
American Society for the Advancement of Phys. Education Report		1885-1895			
American Phys. Education Review		1896.....		1929	
American Association for Health, Physical Education, and Recreation (Journal and Research Quarterly)					1930....
Arbeitsphysiologie (Berlin)				1928.....	
Archives of Internal Medicine			1908.....		
Archives of Psychology			1906.....		

Archives of Physical Therapy		1920
Athletic Journal		1921
Beach and Pool (and Aquatics or Swimming)		1927
Biological Abstracts		1926
Camping Magazine		1930
Child Development Abstracts and Bibliography		1930
Dance Digest		1937
Education Abstracts		1936
Education Index		1929
Food Research		1936
Human Biology		1929
Hygeia		1923
Index Catalogue	1880	1932
International Index		1920
Journal of American Dietetic Assn.		1925
Journal (of the American Medical Association)	1883	
Journal of Educational Psychology	1910	
Journal of Educational Research		1920
Journal of Educational Sociology		1927
Journal of Experimental Education		1920
Journal of Experimental Medicine	1896	
Journal of Experimental Psychology	1916	
Journal of General Psychology		1928
Journal of General Physiology (Rockefeller Institute for Medical Research)	1918	
Journal of Health and Phys. Education		1930
Journal of Heredity	1910	
Journal of Industrial Hygiene and Toxicology	1919	
Journal of Nutrition		1928
Journal of Physical Training	1901	1927
Journal of Physical Education (Y.M.C.A.)		1928
Journal of Proceedings and Addresses	1858	
Journal of School Health		1930
Journal of Social Hygiene	1914	
Lancet	1823	
Loyola Educational Digest		1924
Loyola Educational Index		1928
Mental Hygiene	1917	
Mind and Body	1894	1936
National Research Council, Washington Bulletin	1919	
National Society for the Study of Education Yearbook	1902	
Nations Schools		1928
New England Journal of Medicine	1828	
Northwest Medicine	1903	
Nutrition Abstracts and Reviews		1931
Ohio File	1919	
Pentathlon		1928-1929

Physical Culture	1899.....
Physical Education	1892-1896
Physical Education Digest, Health and Recreation	1934-1938
Physiological Abstracts (London)	1916.....
Physiological Reviews (Baltimore)	1921.....
Physiotherapy Review	1921.....
Poole's Index	1802-1881.....
Poole's Index Supplement	1882.....1906
Progressive Education	1924.....
Psychological Abstracts	1927.....
Psychological Index	1894.....1935
Psychometrika	1936....
Quarterly Cumulative Index Medicus	1927.....
Quarterly Review of Biology	1926.....
Reader's Guide	1900.....
Reader's Guide Abridged	1935....
Reader's Guide Supplement	1907-1919
Record of U. S. Office of Education Publications	1912.....1932
Recreation	1907.....
Research Bulletin of the National Education Ass'n.	1922.....
Research Quarterly, Annual Index	1930....
Review of Educational Research	1931....
Safety Education	1924.....
Scholastic Coach	1931....
School and Society	1915.....
Social Science Abstracts	1929.....1933
The Physical Educator	1940....
Vertical File	1932....

For additional reference to the periodical literature the following sources should be consulted:

1. Mrs. Aletha B. Redman, *Classified List of Recent Periodicals on Health, Physical Education and Athletic Sports Published in the United States and Canada,* Iowa City, Iowa; Serials Department, University of Iowa, 1935, Pp. 74. (Reprinted in *The Research Quarterly,* 6:I) (March, 1935).

2. Mrs. Aletha B. Redman, "A Classified List of Current Periodicals in the Fields of Athletics, Health, Physical Education, and Sports Published in the United States and Canada," *The Research Quarterly,* 14: 277-293, (Oct., 1943).

3. Carolyn F. Ulrich, *Periodical Directory,* New York: R. R. Bowker and Company, 1938, Pp. 455.

4. *Union List of Serials in Libraries of the United States and Canada* (2nd Edition), New York: H. W. Wilson Company, 1943. Edited by Winifred Gregory. Pp. 3065.

LOCATING THESES AND DISSERTATIONS

The doctoral and masters' theses written in schools of educa-

tion and physical education are usually listed in the following sources:

1. *Bibliography of Research Studies in Education,* United States Office of Education, Federal Security Agency, Washington, D. C. Lists research studies with short annotations. Series began in 1926-27. Useful headings are Health and Physical Education, Athletics, Curriculum Studies, Mental Hygiene, Play and Recreation, Physical Ability: Tests and Scales, Physically Handicapped, Research, Surveys. The bulletins which have been published to date are:

Bulletin 1928, (1926-27), No. 22, pp. 107-111.
Bulletin 1929, (1927-28), No. 36, pp. 149-158.
Bulletin 1930, (1928-29), No. 23, pp. 207-219.
Bulletin 1931, (1929-30), No. 13, pp. 304-325.
Bulletin 1932, (1930-31), No. 16, pp. 297-318.
Bulletin 1933, (1931-32), No. 6, pp. 180-195.
Bulletin 1934, (1932-33), No. 7, pp. 123-137.
Bulletin 1935, (1933-34), No. 5, pp. 111-124.
Bulletin 1936, (1934-35), No. 5, pp. 92-104.
Bulletin 1937, (1935-36), No. 6, pp. 110-127.
Bulletin 1938, (1936-37), No. 5, pp. 132-142.
Bulletin 1939, (1937-38), No. 5, pp. 137-156.
Bulletin 1940, (1938-39), No. 5, pp. 136-151.
Bulletin 1941, (1939-40), No. 5, pp. 124-140.

The curriculum studies include sub-heads for Health Education, Physical Education, Athletics, Play and Recreation.

2. *Annual List of Doctoral Dissertations,* Washington, D. C. Library of Congress, 1912 to date. Published by the University of Illinois, 1917-27, and by the U. S. Office of Education since then.

3. "Doctors' Theses in Education," U. S. Office of Education, Washington, D. C. Pamphlet 60, 1934. (797 theses available for loan.)

4. Gilchrist, D. B., *Doctoral Dissertations Accepted by American Universities,* 1933 to date (annually). New York: H. W. Wilson and Co., (Vol. 1, 1934).

5. Derring, Clara E., "Lists and Abstracts of Masters' Theses and Doctoral Dissertations in Education," *Teachers College Record,* 34: 490-502, (March, 1933). Covers 63 colleges and universities.

6. Good, Carter V., "Doctors' Theses Under Way in Education," *Journal of American Research.* (January issues since 1931).

ABSTRACTS OF RESEARCH IN HEALTH, PHYSICAL EDUCATION, AND RECREATION

It is helpful in keeping up with new developments to be able to read abstracts describing new research or results of research work. The abstracts usually cover brief summaries of the work. Only a small portion of the published material is now abstracted. The most important available sources are listed below:

1. Child Development Abstracts

These abstracts are a most important source of reference to tests and studies using research as related to the health, condition, and physique of the child. Almost every aspect of reasearch is covered.

The abstracts are indexed by topic and bound yearly, except that 1927 and 1928 have two volumes each for the year. Included among a large number of magazines which are indexed are the following which have significant material for health and physical education:

Journal of Nervous and Mental Disease
Wistar Institute Bibliographic Service
American Journal of Diseases of Children
Archives of Neurology and Psychiatry
Psychological Abstracts
Physiological Abstracts
Biological Abstracts
Chemical Abstracts
Endocrinology

The principal headings are Anthropometry, Blood Pressure, Correlation, Growth, Measurements, Metabolism, Motor Ability, Nutrition, Physique, Tests and Weight. Published by the Committee on Child Development, National Research Council, Washington, D. C., June 1927-.

2. Digest of Physical Education, Health, and Recreation

This digest gives brief abstracts of important contributions to the literature of physical education, health, and recreation. Quite frequently new tests or articles about testing or research are included in this field. Vol. 1 begins in Oct., 1934, and the digest was discontinued March, 1938. Publisher: C. D. Giauque, editor, 5315 Drexel Avenue, Chicago, Illinois.

3. Physiological Abstracts

These abstracts contain some references to the testing of condition, particularly of muscle-nerve response, blood, and circulatory-respiratory tests. Contains book reviews with the listing of books on diagnosis and physical examinations. The principal headings for tests related to the physiological aspects of health and physical education are: Muscle and Nerve, Special Sense Organs, Blood, Circulation, Respiration, Foods, Metabolism, Kidney-Urine. Published monthly by H. K. Lewis Co., Ltd., London. Issued by the Physiological Society.

4. Microfilm Abstracts

No. 1, Ann Arbor: University Microfilms, 1942. Pp. 71. A collection of Abstracts of Doctoral Dissertations which are Available in Complete Form on Microfilm. Contains no theses related to health, physical education, or recreation.

5. Education Abstracts

Began in 1936 and includes some health and physical education material. Thirty-four headings are used for classifying education material and among these are the following of interest:

1. Administration, Organization, and Supervision.
4. Character Education and Behavior Problems.
5. Child Development and Parent Education.
10. Education of the Physically Handicapped.
17. Health and Physical Education.
21. Mental Hygiene.
25. Professional Education.
32. Test and Measurement Techniques.

Cross-indexing is used when material falls under two or more headings. Covers current material in books, journals, and monographs in English, and some foreign literature. Has author as well as subject-matter index. Bi-monthly. 300-400 abstracts per issue Education Abstracts, 230 Fifth Ave., New York, N. Y.

6. National Research Committee File

Located at New York University, Washington Square, New York. Compiled by this committee under chairmanship of Dr. Frank Lloyd. Contains about 3,000 references to research in health, physical education, and recreation through 1940. Unpublished.

7. Other Abstracts

There are other abstracts but they seem to contain little of significance from the point of view of tests in health and physical education. For scattered material attention may be called to the following:

Biological Abstracts, University of Pennsylvania, 1926-.
Journal of Home Economics, 101 East 20th St., Baltimore, Md.
Loyola Educational Digest, Chicago, Illinois.

TRACING BOOKS

Books may be traced since 1876 in the following sources:

1. *American Catalogue of Books* (1876-1910), New York: Publishers' Weekly.

2. *United States Catalog* (since 1910). New York: H. W. Wilson Co. Gives the most complete list from 1898 to 1928. Books in print Jan. 1, 1928, are listed.

3. *Cumulative Book Index* (1928-1932). New York: H. W. Wilson Co. Supplements the United States Catalog.

4. *Ibid,* 1933-1937.

5. *Ibid,* Monthly Supplements. Cumulative with the United States Catalog and Supplements.

6. *Publishers' Weekly* (1872). Lists publications of the preceding week.

7. *Publishers' Trade List Annual.* Lists all books published in the United States and Canada by publisher.

8. *The Book Review Digest,* covers periodical book reviews.

BOOKS, CONTAINING UNUSUAL BIBLIOGRAPHY AND DISCUSSION OF RESEARCH IN HEALTH, PHYSICAL EDUCATION, AND RECREATION

A few books which include unusual bibliography or summaries of research in health, physical education, and recreation are listed as follows:

1. Amar, Jules, *The Human Motor,* New York: E. P. Dutton and Co., 1920. Pp. 470.

2. Bovard, J. F., and F. W. Cozens, *Tests and Measurements in Physical Education,* Philadelphia: W. B. Saunders Co., 1938 (2nd Edition). Pp. 427.

3. Cureton, T. K. Jr. (Chairman) *Physical Fitness,* Washington, D. C.: (Published as Volume 12, No. 2,) *Supplement to the Research Quarterly,* American Association for Health, Physical Education, and Recreation, May, 1941. Pp. 195.

4. ————————, *Physics Applied to Health and Physical Education,* Springfield, Mass.: Springfield College, 1936. Pp. 180.

5. Dawson, Percy M., *The Physiology of Physical Education,* Baltimore: The Williams and Wilkins Co., 1935. Pp. 938.

6. Demeny, G., *Les Bases Scientifique de L'Education Physique,* Paris: Alcan, 1931. Pp. 335.

7. ————————, *Mecanisme et Educational des Mouvements,* Paris: Alcan, 1924. Pp. 542.

8. Franzen, Raymond, *Health Education Tests,* New York: No. 1 of the School Health Research Monographs, American Child Health Association, 1929. Pp. 70.

9. ————————, *Physical Measures of Growth and Nutrition,* New York: No. II of the School Health Research Monographs, American Child Health Association, 1929. Pp. 137.

10. ————————, *Public Health Aspects of Dental Decay in Children,* New York: No. III of the School Health Research Monographs, American Child Health Association, 1930. Pp. 121.

11. ————————, *Influence of Social and Economic Factors on the Health of the School Child,* New York: No. IV of the School Health Research Monographs, American Child Health Association, 1932. Pp. 144.

12. ————————, *An Evaluation of School Health Procedures,* New York: No. V of the School Health Research Monographs, American Child Health Association, 1933. Pp. 127.

13. Griffin, F. W. W., *The Scientific Basis of Physical Education,* London: Oxford University Press, 1937. Pp. 203.

14. Gould A. G., and J. Dye, *Exercise and Its Physiology,* New York: A. S. Barnes and Co., 1932. Pp. 434.

15. Harris, J. A., *The Measurement of Man,* Minneapolis: University of Minnesota Press, 1930. Pp. 215.

16. Hill, A. V., *Muscular Activity,* Baltimore: The Williams and Wilkins Co., 1926. Pp. 115.

17. ————————, *Muscular Movement in Man,* New York: McGraw-Hill Book Company, 19—.

18. LaPorte, W. R., *The Physical Education Curriculum,* Los Angeles: University of Southern California Press, 1938. Pp. 86.

19. McCloy, C. H., *The Measurement of Athletic Power,* New York: A. S. Barnes and Co., 1932. Pp. 178.

20. ————————, *Tests and Measurements in Health and Physical Education,* New York: F. S. Crofts and Co., 1939. Pp. 392.

21. McCurdy, J. H., and L. A. Larson, *Physiology of Exercise,* Philadelphia: Lea and Febiger, 1939. Pp. 349.

22. McKenzie, R. T., *Exercise in Education and Medicine,* Philadelphia: W. B. Saunders Co., 1924 (3rd Edition). Pp. 601.

23. Monroe, W. S. (Editor) *Encyclopedia of Educational Research,* New York: The Macmillan Co., 1941. Pp. 1344. This important source reviews some important research material in the following fields: *Health Education,* by Dr. Ruth Strang; *Physical Education,* by Dr. A. A. Esslinger; *Measurement of Behavior Traits in Physical Education,* by Dr. Willard P. Ashbrook; *Recreation,* by Dr. G. M. Gloss; *Safety Education,* by Dr. Frank W. Hubbard.

These articles review some of the research related to historical development, methods of teaching, status of physical education, curriculum, individual physical behavior, intramural sports, and professional education:

pp. 140-151, 166, 171, 184 .....Child Development.
pp. 561-571.....Health Education.
pp. 298-303.....Student Health Services.
pp. 667-686.....Learning.
pp. 697-703.....Marks and Marking Systems.
pp. 725-731.....Methods of Teaching.
pp. 735-742.....Motivation.
pp. 773-780.....Norms.
pp. 801-820.....Physical Education.
pp. 926-927.....Recreation.
pp. 989-992.....Safety Education.
p. 1033 .....Playgrounds.
p. 1004 .....Athletic Fields.

24. Savage, H. J. (Secretary) for the *Carnegie Foundation for the Advancement of Teaching,* New York: Carnegie Corporation, 522 Fifth Avenue.

Bulletin No. 18, *Games and Sports in British Schools and Colleges* (1926).

Bulletin No. 23, *American College Athletics* (1926).

Bulletin No. 24, *Literature of American College Athletics* (1930).

Bulletin No. 26, *Current Development in American College Sport* (1931). Pp. 58.

25. Schmidt, F. A., and W. Kohlrausch, *Physiology of Exercise,* (translated from German by Carl B. Sputh, Emil Rath, and Leopold Zwarg), Philadelphia: F. A. Davis Co., 1931. Pp. 216.

26. Schneider, Edward C., *Physiology of Muscular Activity,* Philadelphia: W. B. Saunders Co., 1941 (2nd Edition). Pp. 428.

27. Woodring, Maxine N., and Norma Schwendener, *Enriched Teaching of Physical Education in the High School,* New York: Teachers College, Columbia University, 1929. Pp. 143.

28. Yearbooks of the National Society for the Study of Education. A few of the yearbooks of this organization which have dealt with health and physical education research are as follows:

9th Yearbook, 1910—Part I—Health and Physical Education, by T. D. Wood.

14th Yearbook, 1915—Part II—Methods for Measuring Teachers' Efficiency.

15th Yearbook, 1916—Standards and Tests for the Measurement of the Efficiency of Schools and School Systems.

17th Yearbook, 1918—The Measurement of Educational Products.

34th Yearbook, 1935—Educational Diagnosis.

35th Yearbook, 1936—The Grouping of Pupils.

DICTIONARIES AND GLOSSARIES OF HEALTH, PHYSICAL EDUCATION, AND RECREATION

Several dictionaries and glossaries helpful to the field are listed as follows:

1. *Glossary of Physical Education Terms,* College Physical Education Association, 1937. Pp. 78.

2. J. H. McCurdy, *Calisthenic Nomenclature,* Springfield, Mass.: American Physical Education Association· 1916. Pp. 34.

3. *Dorland Medical Dictionary.*

ENCYCLOPEDIAS AND GUIDES, USEFUL IN HISTORICAL RESEARCH

Several encyclopedias are useful in historical research:

1. *The Americana,* covers anatomy, physiology, sports, physical education, and health.

2. *The Britannica,* covers almost the same as *The Americana.*

3. *Compton's Pictured Encylopedia,* covers games, playing fields and techniques, also includes anatomy and physiology.

4. Krout, John A., *The Pageant of America,* New Haven: Yale University Press, 1929. Pp. 360.

5. *The World Book Encylopedia,* covers playing fields, techniques of games, and rules of sports; also some anatomy and physiology.

6. *World Almanac,* New York: New York World Telegram, Vol. 1, 1886, and annually to date. Contains statistical information on records in athletic sports.

7. F. E. Leonard and R. T. McKenzie, *A Guide to the History of Physical Education,* Philadelphia: Lea and Febiger, 1927. Pp. 371.

8. Emmett A. Rice, *A Brief History of Physical Education,* New York: A. S. Barnes and Co., 1935. Pp. 288.

9. *Statistical Bulletin,* New York: Welfare Division of the Metropolitan Life Insurance Company.

10. Report of the (First)—Tenth Annual Meeting: American Association for the Advancement of Physical Education, 1885-1896. (10 nos.).

AVAILABLE BIBLIOGRAPHIES OF HEALTH, PHYSICAL EDUCATION, AND RECREATION

1. Affleck, George B., "Bibliographies," March, 1910, to December, 1941, inclusive. Published yearly in the *Research Quarterly* of the American Association for Health, Physical Education, and Recreation, since 1929. Previously the bibliographies are to be found in the *American Physical Education Review*:

AMERICAN PHYSICAL EDUCATION REVIEW

I.	Bibliography of Physical Training	15: 193-209 (Mar., 1910)
II.	" " " "	15: 455-468 (June, 1910)
III.	" " " "	15: 662-680 (Dec., 1910)
IV.	" " " "	16: 206-216 (Mar., 1911)
V.	" " " "	16: 407-418 (June, 1911)
VI.	" " " "	16: 579-592 (Dec., 1911)
VII.	" " " "	17: 112-119 (Feb., 1912)
VIII.	Bibliography of Phys. Tr. & Hyg.	17: 479-492 (June, 1912)
IX.	" " " " " "	17: 624-636 (Nov., 1912)
X.	" " " " " "	18: 105-119 (Feb., 1913)
XI.	" " " " " "	18: 397-414 (June, 1913)
XII.	" " " " " "	18: 532-545 (Nov., 1913)
XIII.	Selected Biblio. of Phys. Tr. & Hyg.	19: 152-166 (Feb., 1914)
XIV.	" " " " " " "	19: 465-477 (June, 1914)
XV.	" " " " " " "	19: 581-591 (Nov., 1914)
XVI.	" " " " " " "	20: 90-100 (Feb., 1915)

XVII.	" " " " " " "	20: 353-363 (June, 1915)
XVIII.	" " " " " " "	20: 523-534 (Nov., 1915)
XIX.	" " " " " " "	21: 109-121 (Feb., 1916)
XX.	" " " " " " "	21: 378-390 (June, 1916)
XXI.	" " " " " " "	21: 476-489 (Nov., 1916)
XXII.	" " " " " " "	22: 95-108 (Feb., 1917)
XXIII.	" " " " " " "	22: 367-381 (June, 1917)
XXIV.	" " " " " " "	22: 535-550 (Dec., 1917)
XXV.	" " " " " " "	23: 99-115 (Feb., 1918)
XXVI.	" " " " " " "	23: 439-447 (Oct., 1918)
XXVII.	" " " " " " "	23: 481-487 (Nov., 1918)
XXVIII.	" " " " " " "	24: 17-26 (Jan., 1919)
XXIX.	" " " " " " "	24: 147-154 (Mar., 1919)
XXX.	" " " " " " "	24: 394-401 (June, 1919)
XXXI.	" " " " " " "	24: 496-502 (Dec., 1919)
XXXII.	" " " " " " "	25: 150-400 (April, 1920)
XXXIII.	" " " " " " "	25: 400-406 (Dec., 1920)
XXXIV.	" " " " " " "	26: 79-85 (Feb., 1921)
XXXV.	" " " " " " "	26: 195-200 (April, 1921)
XXXVI.	" " " " " " "	26: 420-424 (Dec., 1921)
XXXVII.	" " " " " " "	27: 114-118 (Mar., 1922)
XXXVIII.	" " " " " " "	27: 251-257 (June, 1922)
XXXIX.	" " " " " " "	27: 470-474 (Dec., 1922)
XL.	" " " " " " "	28: 58-62 (Feb., 1923)
XLI.	" " " " " " "	28: 222-230 (May, 1923)
XLII.	" " " " " " "	28: 421-426 (Nov., 1923)
XLIII.	" " " " " " "	29: 114-120 (Mar., 1924)
XLIV.	" " " " " " "	29: 361-370 (June, 1924)
XLV.	" " " " " " "	29: 520-526 (Nov., 1924)
XLVI.	" " " " " " "	30: 119-126 (Mar., 1925)
XLVII.	" " " " " " "	30: 334-343 (June, 1925)
XLVIII.	" " " " " " "	30: 556-566 (Dec., 1925)
XLIX.	" " " " " " "	31: 885-893 (June, 1926)
L.	" " " " " " "	31: 1064-1068 (Nov., 1926)
LI.	" " " " " " "	31: 1138-1141 (Dec., 1926)
LII.	" " " " " " "	32: 162-168 (Mar., 1927)
LIII.	" " " " " " "	32: 432-436 (June, 1927)
LIV.	" " " " " " "	32: 720-730 (Dec., 1927)
LV.	" " " " " " "	33: 240-247 (April, 1928)
LVI.	" " " " " " "	33: 520-532 (Oct., 1928)
LVII.	" " " " " " "	34: 218-226 (April, 1929)

RESEARCH QUARTERLY

LVIII. Bibliography for 1929	1: 131-150 (Oct., 1930)
LIX. Bibliography for 1930	2: 137-163 (May, 1931)
LX. Bibliography for 1931	3: 122-154 (Dec., 1932)
LXI. Bibliography for 1932	4: 118-147 (Dec., 1933)
LXII. Bibliography for 1933	5: 127-150 (Dec., 1934)
LXIII. Selected Bibliography for 1934	6: 137-163 (Dec., 1935)
LXIV. Selected Bibliography for 1935	7: 3-43 (Dec., 1936)
LXV. Selected Bibliography for 1936	8: 122-152 (Dec., 1937)
LXVI. Selected Bibliography for 1937	9: 128-166 (Dec., 1938)
LXVII. Selected Bibliography for 1938	10: 103-154 (Dec., 1939)
LXVIII. Selected Bibliography for 1939	11: 135-169 (Dec., 1940)
LXIX. Selected Bibliography for 1940	12: 785-809 (Dec., 1941)

Next to the *Education Index* these bibliographies represent the best source for current references and the means of keeping up to date. However, some sources are not covered including the published materials of city departments in syllabi and courses of study, state reports and syllabi, research materials on health and physical education published in Bulletins of General Education. The references are unannotated.

2. Affleck, G. B., "Selected Bibliography of Graduate Theses," Springfield College, 1929-34, Supplement to the *Research Quarterly*, 6: 126-128, (May, 1935). "Masters' Theses, Springfield College, Division of Health and Physical Education," (1935-1940), *Supplement to the Research Quarterly*, 12: 490-493 (May, 1941).

3. American Sports Publishing Co., *Rule Books* (in various sports) Publishers Lists, New York, 150 Nassau Street.

4. Barnes, A. S. and Co. "A Bibliography of Books on Health and Physical Education," *Journal of Health and Physical Education*, 3: 3-32 (Nov. 1932).

5. Bass, Ruth, "Additions to the Files of the Committee for Research of the National Association of Directors of Physical Education for College Women, 1939-41," *Research Quarterly*, 13: 388-396 (Oct., 1942).

————, "Studies for the Years 1937-39 Listed in the Files of the Committee for Research for the National Association of Directors of Physical Education for College Women," *Research Quarterly*, 11: 150-168 (May, 1940).

6. Beaumont, Cyril W., *A Bibliography of Dancing*, London: *The Dancing Times*, 1929. Pp. 228.

7. "Bibliography of the Dance and Related Arts," *Camping Magazine*, 1: 23-25 (June, 1933).

8. "Bibliographies of Research in Education." See U. S. Office of Education lists under theses and dissertations.

9. Brame, Sidney, *Annotated Bibliography of the Aims and Objectives of Physical Education*. Nashville: Peabody Teachers College, Master's Thesis, 1932. Pp. 122. (Ms.).

10. Bridges, Dwight T., *Bibliography of Physical Training*, Physical Director's Society of the Y.M.C.A. of North America, Springfield, Mass. (Supplements the McCurdy bibliography) 1912. Pp. 172. (Covers the period 1906 to May, 1911.)

11. Browne, A. D., "Classification of Completed Theses and Selected Subjects Written by Students in Various Colleges and Universities in the United States," *Research Quarterly*, 2: 119-151 (Oct. 1931).

12. Burnham, W. H., "Bibliography of School Hygiene," *Addresses and Proceedings*, National Education Association. 500-523, 1898. The first extensive school health bibliography.

13. Callender, Ruth M., *Annotated Bibliography in the Dance and Classification of Material.* Nashville: Peabody Teachers College, 1933. Pp. 93 (Ms).

14. Chayer, M. E., *Bibliography in Health Education for Schools and Colleges,* New York: Putnam, 1936. Pp. 100.

15. Cureton, T. K., *Index of Springfield College Research Studies in Health, Physical Education, and Recreation,* Springfield, Mass.: (Reproduced in mimeograph at Springfield College), 1937. Pp. 57 (Supplementary Sheets for 1937, 1938, 1939, 1940).

16. Cureton, T. K., *A Guide to Tests and Measurements in Health and Physical Education,* Springfield, Mass.: (Privately published in mimeograph) 1936. Pp. 78.

17. Cureton, T. K., "Review of a Decade of Research in Aquatics at Springfield College, 1929-39," *Research Quarterly,* 11: 68-79 (May, 1940).

18. Cureton, T. K., C. E. Turner, and Emma McCloy Layman, "A Selected Bibliography on Physical Fitness," *Research Quarterly,* 14: 112-124 (March, 1943).

19. Cureton, T. K. (Chairman) J. D. Brock, W. A. Cox, P. V. Karpovich, L. A. Larson, E. W. Pennock, H. S. Seashore, and G. B. Affleck, *Physical Fitness, Supplement to the Research Quarterly,* 12: 301-493 (May, 1941) Contains approximately 900 references to the physical fitness literature.

20. DaGrosa, J. A., *A Complete Bibliography of Football,* Ann Arbor, Michigan: The Edwards Press, 1935. Pp. 88.

21. Dear, Elaine M., Louise S. Kjellstrom, and Jenny E. Turnbull, "Motion Pictures in Sports; A Bibliography and Film List," Washington, D. C.: American Association for Health, Physical Education, and Recreation (National Section on Women's Athletics) 1939. Pp. 34.

22. "Decade of American Sporting Books and Prints, 1927-37," New York: Derrydale Press, 1937. Pp. 71.

23. Dyer, Joanna T., "Physical Education in Adult Education, A Bibliography," *Journal of Health and Physical Education,* 5: 26-27 (May, 1934).

24. Fishbein, M., *Health Books Old and New,* Chicago: American Library Association, 1936. Pp. 31.

25. Fox, Stella, "An Annotated and Critical Bibliography of Books on Fencing," *The Research Quarterly,* 13: 116-122 (March, 1942).

26. Gloss, G. M., "Bibliography of Masters' Theses and Doctoral Studies in the Field of Recreation," *The Research Quarterly,* 11: 150-163 (March, 1940).

27. Gloss, G. M., *Recreational Research,* Baton Rouge: J. E. Ortlieb Company, 1940. Pp. 63.

28. Gray, Ruth A., "Health and Physical Education," *Bibliography of Research Studies in Education, 1931-32,* Bulletin No. 6. Pp. 180-189, Washington, D. C.: U. S. Office of Education, 1933.

29. Greene, E. B., and C. H. McCloy, "Bibliography of (Books) Health and Physical Education," *Research Quarterly, 7*: 3-43 (Dec., 1936). Covers period of Jan. 1, 1932, to Dec. 31, 1935. Some 1200 titles. Not annotated.

30. Greenwood, Frances A., *Swimming—A Bibliography from the Earliest Written Records Through June,* 1938. New York: H. W. Wilson Co., 1939. Pp. 308.

31. *Index of Folk Dances and Singing Games.* Chicago: American Library Association, 1936. Pp. 202.

32. *Journal of Educational Research* has carried since March, 1937, a section entitled, "Research Abstracts and Bibliographies," edited by Dr. A. S. Barr, of the University of Wisconsin. Another section covers, "Research News and Communications," edited by Dr. Carter V. Good, of the University of Cincinnati. This lists the doctors' theses under way in American universities including physical, health, and safety education.

33. Kilander, H. F., "A Bibliography of Textbooks in Health Education for the Elementary and High Schools," 10: 25-32 (May, 1939).

34. LaGrange, Marie J., "Health Education, An Annotated Bibliography," Indianapolis: Indiana State Library, 1938. Pp. 25. (Mimeographed).

35. Larkin, Arthur E., "A Bibliography of Skiing in the English Language," *Research Quarterly,* 6:125-128 (Dec., 1935).

36. Law, J. S., "Bibliography on Swimming and Life Saving," *American Physical Education Review, 29:* 374-6 (June, 1924).

37. Leonard, F. E., "A Selected Bibliography of the History of Physical Training," *American Physical Education Review, 7*:39-48 (March, 1902).

38. Lottinville, Armand J., "A Bibliography on Boxing," *Research Quarterly,* 9: 129-153 (Oct., 1938).

39. Magriel, Paul A., *"A Bibliography of Dancing,"* New York: H. W. Wilson and Co., 1936. Pp. 229. *Supplement to A Bibliography of Dancing.* New York: H. W. Wilson and Co, 1937. Pp. 41.

40. Magriel, Paul A., "A Selected Bibliography of the Dance in Health, Hygiene and Physiology," *Research Quarterly,* 10: 113-114 (May, 1939).

41. McCloy, C. H., "Bibliography of Health and Physical Education," *Research Quarterly,* 3: 3-78 (Oct., 1932). Over 2,000 entries. Not annotated.

42. McCurdy, J. H., *Bibliography of Physical Training,* Physical Directors' Society of the Y. M. C. A.'s of North America, Springfield, Mass. (Third Edition, revised and enlarged) 1905. Pp. 369. Best source for literature previous to 1905. Includes many references hard to find elsewhere, some 6,000 titles. Indexed by topic and author. The first extensive bibliography in physical training. New York: G. E. Stechert Company.

43. Monroe, W. S., C. W. Odell, M. E. Herriott, Max D. Englehart, and Mable R. Hull, *"Ten Years of Educational Research, 1918-1927,"* Bulletin No 42, Bureau of Educational Research, 1918-1927, College of Education, University of Illinois, Urbana, Illinois, 1928, 367 pages. Contains 3,650 references to educational research with a topical index in which there are a number of headings covering tests and testing procedures. Principal headings include Athletics, Character Education, Health, Motor Coordination and Reaction, Physical Education, Growth, Physical Measurements. This is one of the very best sources for techniques of research and test construction.

44. Monroe, W. S. and Louis Shores, *Bibliographies and Summaries in Education to July, 1935.* New York: H. W. Wilson and Co., 1936. Pp. 470. Covers 4,000 annotated bibliographies and summaries listed under author and subject in one alphabet.

45. *Music Appreciation Materials and Records for Physical Education in Elementary and High Schools.* (Supplement to Library Lists) Montgomery, Ala.: Wilson Printing Co., 1930. Pp. 34.

46. National Safety Council: "Books and Pamphlets on Accident Prevention, Health and Industrial Hygiene, 1932."

47. Patterson, R. S., "Selected Public Health Bibliography with Annotations," *American Journal of Public Health,* 38: 630-4. (April 22, 1938).

48. Phelan, Annete M., *A Bibliography of Early Contributions to the Literature of School Health Standards.* Pp. 239-249, *School Health Standards,* Menasha, Wis., Banta Pub. Co., 1934.

49. *Physical Education Bibliography,* Seattle, Washington: University of Washington Press, 1929. Pp. 31. (Compiled by physical education majors, Class of 1929).

50. Pierce, Anna Eloise, *Catalogue of Student Health Literature,* New York: Professional and Technical Press, 1927. Pp. 75.

51. Pierce, J. M., "List of Bibliographies of Gymnastics and Other Topics Relative to Physical Education," *American Physical Education Review,* 2: 60-64 (March, 1897).

52. Pritchard, Elizabeth G., (assisted by Margaret T. Prince). "Selected Bibliography on Health and Medical Services in the United States, and Related Subjects with Special Reference to the National Health Conference of 1938." Washington, D. C.: Informational Service, Division of Sanitary Reports and Statistics, United States Public Health Service, Federal Security Agency. Nov. 1, 1939. Pp. 37. (Mimeographed).

53. Ready, Marie M., "Good References on Physical Education and Recreation for Exceptional Children," Washington, D. C.: U. S. Office of Education, Department of Interior, Bibliography No. 11, 1932. Pp. 10.

———————, and Louise O. Pettit, "United States Government Publications Useful in Physical Education and Recreation," Washington, D. C.: U. S. Office of Education, Circular No. 68, 1932. Pp. 4.

54. *"Review of Educational Research Bibliographies,"* American Educational Research Association, National Education Association, 1201 16th St, N.W., Washington, D. C. Began 1931. These bulletins review and summarize research with the presentation of an adequate but well chosen bibliography in each report. Major themes are taken and topics reviewed in relationship to this theme by foremost experts in the field. Health and physical education are included, and are usually well treated. The general pattern is fifteen principal divisions of education rotating in a three-year cycle. The bibliographies and reviews of greater significance to health and physical education are:

Vol. I. Oct., 1931, No. 4, *Special Methods in the Elementary School.* G. B. Affleck, "Health," Pp. 398-402.

Vol. I. Feb., 1932, No. 1, *Special Methods on the High School Level.* S. C. Staley, "Physical Education," Pp. 78-79.

Vol. II. June, 1932, No. 3, *Tests of Personality and Character.* Goodwin B. Watson, "Character Tests and Their Applications Through 1930."

Vol. III. Feb., 1933, No. 1, *Educational Tests and Their Uses.*

Vol. III. April, 1933, No. 2, *Mental and Physical Development.* Helen L. Dawson and George D. Stoddard, "Physical Growth From Birth to Puberty," Pp. 130-149. Harold E. Jones, "Relationships in Physical and Mental Development," Pp. 150-162.

Vol. IV. Feb., 1934, No. 1, *Methods and Technics of Educational Research.*

Vol. IV. April, 1934, No. 2, *The Curriculum.* Thomas D. Wood, "Health and Physical Education," Pp. 160-165.

Vol. IV. June, 1934, No. 3, *Teacher Personnel.* Jeanette Stein, "The Health of the Teacher," Pp. 308-311.

Vol. IV. Dec., 1934, No. 5, *Psychology and Methods in the High School and College.* G. B. Affleck, "Health and Physical Education," Pp. 503-506.

Vol. V. Feb., 1935, No. 1, *Special Methods and Psychology of the Elementary School Subjects.* Ruth Strang, "Health and Physical Education," Pp. 48-53.

Vol. V. June, 1935, No. 3, *Psychological Tests.*

Vol. V. Oct., 1935, No. 4, *The School Plant.* T. C. Holy, "School Playgrounds, Their Surfacing, Administration, Use and Care," Pp 364-369.

Vol. V. Dec., 1935, No. 5, *Educational Tests and Their Uses.*

Vol. VI. Feb., 1936, No. 1, *Mental and Physical Development.* Beth L. Wellman, "Motor Development from Two Years to Maturity," Pp. 49-53. H. V. Meredith and George D. Stoddard, "Physical Growth from Birth to Maturity," Pp. 54-84. Harold E. Jones, "Relationships in Physical and Mental Development," Pp. 102-123.

Vol. VI. April, 1936, No. 2, *Pupil Personnel, Guidance and Counseling.* A. J. Brumbaugh, "Health and Hygiene," Pp. 205.

Vol. VI. June, 1936, No. 3, *Psychology of Learning, General Methods of Teaching and Supervision.* G. T. Buswell, "Motor Learning and Skill," Pp. 291-293.

Vol. VI. Dec., 1936, No. 5, *Mental Hygiene and Adjustment.* Harry J. Baker, "Physically and Mentally Exceptional Children," Pp. 514-523.

Vol. VII. April, 1937, No. 2, *The Curriculum.* Delbert Oberteuffer, "Health and Physical Education," Pp. 149-152.

Vol. VII. June, 1937, No. 3, *Teacher Personnel.* Earl W. Anderson, "Physical and Mental Health of Teachers and Administrative Adjustments," Pp. 288-289.

Vol. VII. Dec., 1937, No. 5, *Special Methods and Psychology of the Elementary School Subjects.* Vernon Jones, "Character Education," Pp. 467-473. Ruth Strang, "Health and Physical Education," Pp. 482-490.

Vol. VIII. Feb., 1938, No. 1, *Psychology and Methods in the High School and College.* Edgar W. Everts, "Health and Physical Education," Pp. 39-41.

Vol. VIII. June, 1938, No. 3, *Psychological Tests and Their Uses.*

Vol. VIII. Dec., 1938, No. 5, On *Educational Tests and Their Uses.*

Vol. IX. Feb., 1939, No. 1, On *Mental and Physical Development.* Nancy Bayley, "Mental and Motor Functions from Two to Twelve Years," Pp. 18-37. Howard V. Meredith, "Physical Growth from Birth to Maturity," Pp. 47-79. Howard V. Meredith, "Techniques of Research in Physical Growth and Anthropometry," Pp. 80-90. Harold E. Jones, "Relationships in Physical and Mental Development," Pp. 91-102.

Vol. IX. April, 1939, No. 2, On *Pupil Personnel, Guidance, and Counseling.*

Vol. IX. June, 1939, No. 3, On *Psychology of Learning, General Methods of Teaching, and Supervision.*

Vol. IX. Dec., 1939, No. 5, On *Methods of Research in Education.*

Vol. X. June, 1940, No. 3, On *Teacher Personnel.* Dewey B. Stuit, "Mental and Physical Health of Teachers and Administrative Adjustments," Pp. 224-227.

Vol. X. Dec., 1940, No. 5, On *Mental Hygiene and Health Education,* Mabel E. Rugen, "Physical Hygiene and Health Education," Pp. 464-471.

Vol. XI. Feb., 1941, No. 1, On *Psychological Tests and Their Uses.*

Vol. XI. June, 1941, No. 3, *Education of Exceptional Children and Minority Groups.*

Vol. XI. Dec., 1941, No. 5, *Growth and Development.*

Vol. XII. Feb., 1942, No. 1, *Pupil Personnel, Guidance, and Counseling.*

Vol. XII. Dec., 1942, No. 5, *Methods of Research and Appraisal in Education.* Carter V. Good, *Techniques in Education, Psychology and Social Science,* Pp. 460-478.

55. Russell Sage Foundation: New York, N. Y. "Recreation Bibliography," 1920. "Community Health a Selected Bibliography," 1921. Pp. 4. "Medical Inspection of Schools," 1924. Pp. 4. "List of References on Play and Recreation," 1927. Pp. 94. "List of References on Camps and Camping," 1934 Pp. 4. "List of References on New Leisure," 1936. Pp. 4. "List of References on Recreation," 1938. Pp. 6.

56. Ryan, W. Carson, Jr., *The Literature of American School and College Athletics,* New York: Carnegie Foundation for the Advancement of Teaching. 1930. Pp. 305. (1,000 titles of books, magazines, reports.)

57. Samse, Leroy P., *Annotated Bibliography for Motivating Leisure Time Sports Activities,* Los Angeles: University of Southern California, Master's Thesis, 1937.

58. Sanchez, D. Rufino Blanco Y., *"Bibliografia General de la Education Fisica,"* (Printed in Spain), Madrid, 1927. Covers literature from 1400 to 1925. Vol. I, 1007 Pp.. Vol. II (Indexes) 452 Pp. Preface is translated into English and French. Has alphabetical index of authors and anonymous works. Covers a total of 19,619 articles of 15,000 different authors and with 16,709 bearing the names of the authors. The works are of all times and in all languages divided approximately as follows: English (9,267), French (2,494), German (2,413), Spanish (2,334), Italian (888), Swedish (227), Portuguese (218), Polish (196), Various (334). The index includes 25,000 works used in physical education. Sanchez points out that no other pedagogical topic has accumulated such exhaustive bibliography. Does not contain much research work. Has 41 references to anthropometry, 44 references to measurement, and 9 to tests.

59. Savage, H. J. (Secretary) *Literature of American College Athletics,* New York: Bulletin No. 24, Carnegie Foundation for the Advancement of Teaching, 1930. Pp. 305.

60. Schwartz, Louis, "A Resume, with Comments, of the Available Literature Relating to Posture," *Public Health Reports,* Reprint No. 1156, May 6, 1927, Pp. 1219-1248.

61. Sefton, Alice Allene, "A Guide to the Literature of Physical Education, Including Certain Aspects of Health Education and Recreation," *Research Quarterly,* 6: 3-47, (December 1935); 6: 63-74, (March, 1935).

62. Shearer, Florence M., "A Study of the Amounts and Types of Physical Education Material Found in Education Magazines," *Research Quarterly,* 7: 131-135, (March, 1936).

63. Silvia, C. E., *Life Saving and Water Safety Bibliography,* Springfield, Mass., Unpublished Thesis, 1940. Pp. 274.

64. Spalding, "Bibliography of Spalding Baseball Collection," New York: Public Library, 1922.

65. Storey, Edward J., *Free Printed Materials in Health Education,* New York: New York University, Doctor's Thesis, 1940. Pp. 157 (M.S.)

66. Sutton, W. A. and others, "Bibliography on Health Training and Instruction in Junior and Senior High Schools, 1917-28," Pp. 467-476, *Sixth Yearbook of the Department of Superintendence,* 1928. Washington, D. C.: National Education Association.

67. Szukovathy, I., "Some Notes on the History of Sport Bibliography," *Research Quarterly,* 8: 3-14, (March, 1937).

68. *The Elementary School Journal,* (Selected Bibliographies). These cover various phases of elementary education including physi-

cal education and, more recently, health and physical education. A chronological list of those published to date are as follows:

I. L. B. Sharp, "Physical Education," 34: 226-27 (Nov., 1933).
II. Newton Edwards and Mabel Waltz, "Health and Physical Education," 35: 224-226 (Nov., 1934).
III. *Ibid.*, 36: 226-227 (Nov., 1935).
IV. C. H. McCloy, "Health and Physical Education," 37: 223-225 (Nov., 1936).
V. *Ibid.*, 38: 226-227 (Nov., 1937).
VI. *Ibid.*, 39: 227-228 (Nov., 1938).
VII. *Ibid.*, 40: 227 (Nov., 1939).
VIII. *Ibid.*, 41: 224-225 (Nov., 1940).
IX. D. K. Brace, "Health and Physical Education," *The Elementary School Journal.* 42: 227-228 (Nov., 1941).
X. *Ibid.*, "Health and Physical Education," 43: 185 (Nov., 1942).

69. *The School Review* (Selected Bibliographies). These cover all of the principal areas of secondary education, including physical education and, more recently, health and physical education. The bibliographies on extracurricular studies contain much about athletics. A chronological list of these sources is as follows:

I. Paul W. Terry, "Summary of Investigations of Extra-Curriculum Activities in 1931, I," *The School Review,* 40: 124-137 (Feb., 1932).
II. *Ibid.,* II., 40: 182-191 (March, 1932).
III. Paul W. Terry, "Summary of Investigations of Extra-Curriculum Activities in 1931, I," *The School Review,* 40: 505-514 (Sept. 1932).
IV. *Ibid.,* II., 40: 613-619 (Oct., 1932).
V. *Ibid.,* "Selected References on the Extra-Curriculum," *The School Review,* 41: 299-306 (April, 1933).
VI. L. B. Sharp, "Physical Education," *The School Review,* 41: 224-226 (March, 1933).
VII. L. B. Sharp, "Physical Education," *The School Review,* 42: 225-226 (March, 1934).
VIII. Paul W. Terry, "Selected References on the Extra-Curriculum," *The School Review,* 43: 300-306 (April, 1935).
IX. C. H. McCloy, "Physical Education," *The School Review,* 43: 224-228 (March, 1935).
X. Paul W. Terry, "Selected References on the Extra-Curriculum," *The School Review,* 44: 298-306 (April, 1936).
XI. C. H. McCloy, "Physical Education," *The School Review,* 44: 226-228 (March, 1936).
XII. Paul W. Terry, "Selected References on the Extra-Curriculum," *The School Review,* 45: 300-306 (April, 1937).

XIII. D. K. Brace, "Health and Physical Education," *The School Review,* 45: 227-228 (March, 1937).

XIV. Paul W. Terry, "Selected References on the Extra-Curriculum 46: 300-306 (April, 1938).

XV. D. K. Brace, "Physical Education," *The School Review,* 46: 226-227 (March, 1938).

XVI. Paul W. Terry, "Selected References on the Extra-Curriculum," *The School Review,* 47: 299-306 (April, 1939).

XVII. *Ibid.,* 47: 224-226 (March, 1939).

XVIII. D. K. Brace, "Health and Physical Education," *The School Review,* 48: 224-226 (March, 1940).

XIX. *Ibid.,* "Health and Physical Education," *The School Review,* 49: 226-228 (March, 1941).

70. United States, Bureau of Education, "List of References on Play and Playgrounds," 1924. "School Playgrounds and References," 1930. (Also refer to references listed under Marie M. Ready).

71. Williams, J. F., *Topical Sources for Personal Hygiene,* New York: W. B. Saunders and Company, 1929. Pp. 97.

72. Wood, T. D., and C. L. Brownell, *"Source Book in Health and Physical Education,"* New York: The Macmillan Company, 1925, Pp 539-559.

73. Wood, T. D., and others, "Bibliography on Hygiene and Physical Education," New York: Teachers College, Columbia University, 1911.

74. Y.M.C.A.'s of the United States and Canada:

Research and Studies I., 1929.
Research and Studies II., 1930.
Report of the Conference on Research, 1940.
National Council of Research, National Council of the Y.M.C.A., 347 Madison Avenue, New York, N. Y.

READING BIBLIOGRAPHY

1. Alexander, Carter, *How To Locate Educational Information and Data,* New York: Bureau of Publications, Teachers College, Columbia University, 1941. Pp. 439.

2. Cushman, Wesley P., "Library Research That Works," *Research Quarterly,* 10: 113-116. (Mar., 1939).

3. Flack, Howard W., "Library Guide to Physical Education," *Peabody Journal of Education,* 16: 335-53, (March, 1939).

4. Good, Carter V., "Bibliographical and Documentary Techniques in Education, Psychology, and Social Science," *Review of Educational Research,* 12: 460-478, (Dec. 1942).

————, "Library Methods in Educational Research,"

Review of Educational Research, 4: 92-96, (Feb., 1934).

5. Good, C. V., A. S. Barr, and D. E. Scates, *The Methodology of Educational Research,* pp 104-184, "The Survey of Related Information," New York: D. Appleton-Century Co., 1936.

6. Mudge, I. G., *New Guide to Reference Books* (5th ed.), Chicago: American Library Association, 1929. (Annual supplements are available.)

7. *Research Bulletin of the National Education Association,* "Salaries of City School Employees, 1940-41," 19:2, March, 1941. (Published by the Research Division of the National Education Association).

8. Witmer, Eleanor M., and Margaret C. Miller, "Guides to Educational Literature in Periodicals, Indexes, Abstracts, Bibliographies," *Teachers College Record,* 33:719-730. (May 1932).

The Value of the Motion Picture as an Instructional Device in Learning A Motor Skill

By Aileene Lockhart
University of Nebraska
Lincoln, Nebraska

EDUCATORS advocate the use of the motion picture as an instructional device; this teaching aid is especially emphasized in instances where an understanding of motion and time is essential. Although there have been a number of motion picture studies of an experimental nature relative to various phases of learning, the area including the ability to perform acts of skill has been largely neglected. Examples which indicate the use of the motion picture in such investigations include the handling of objects in physics and home economics laboratories and the position of the pen in handwriting.

THE PROBLEM

This study was undertaken to determine the value of the motion picture as an aid to learning in an instructional situation in the field of physical education. Because of its availability and because of the objectivity offered in measuring the degree of successful performance, bowling was selected as the activity to be observed. The present study is then specifically concerned with determining the value of the motion picture as an instructional device in learning a motor skill of bowling.

PRELIMINARY STUDIES

Since an understanding of the problem of learning a motor skill must involve a consideration both of the means by which behavior is changed and the generally accepted form of the skill which is to be learned, it was necessary before making the final experiment to review the available explanatory evidence regarding the sensory-motor bases for learning and to summarize the professionals' criteria of good form in bowling. As no instructional film in bowling was ava lable, a suitable one for beginning classes of college women was produced. This film was used in the experiments described in this study. It was also necessary to find a valid and reliable measure of performance in bowling, and to make preliminary studies in order to

Abstract of a thesis submitted in partial fulfillment for the degree of Doctor of Philosophy, University of Wisconsin, 1942. The study was made under the supervision of Associate Professors C. E. Ragsdale and Ruth B. Glassow.

test the experimental instructional and organizational procedures employed in the final study.

The Validity of the Test.—The stated purpose of this entire study was to determine the value of the motion picture as an instructional device in learning a motor skill in bowling, that skill being performance with the first ball. The study was limited to this one skill because the setup for the first ball in bowling is always the same whereas the conditions for the second attempt in each frame differ. It was thought that perhaps a better measure of this one skill could be obtained than for the game of bowling as a whole. Primary interest in the study lay in the question of the value of the motion picture rather than in an attempt to measure bowling ability. As far as this particular study is concerned there does not appear to be a question of validity involved as the ultimate goal is the performance itself and not some more general learning ability. By using all ten first balls as a measure of success on the first balls, it is seen that this skill is not taken as a sampling of some more complicated ability. The study was thus arbitrarily limited.

Many persons may be interested, however, in a comparison of selected methods of scoring in relation to the scoring ordinarily known in the game of bowling. The following methods of scoring were investigated:

1. The correlation between the usual method of scoring and using the first balls only in each frame, (a) the first ten balls, (b) the best nine of the first ten balls, (c) the best eight of the first ten balls, (d) the best six of the first ten balls.

2. The correlation between the usual method of scoring and using the second balls only in each frame, (a) the total of the spares.

3. The correlation between the usual method of scoring and using the total number of pins knocked down with both balls, (a) in all ten frames, and (b) in the best nine of the ten frames.

In order to obtain indications of the relationship between scoring methods at different levels of ability, correlations were computed for the first, fourth, and seventh weeks of the instructional period. It was found that the total of both balls correlates highly with the usual method of scoring bowling (.92). Since there are only two balls per frame in bowling, however, the question of why a perfect correlation was not found may arise. The answer lies in the method of scoring bowling which grants extra points for making strikes and spares. In one line there is a total of one hundred pins to be knocked down but a perfect score in bowling is three hundred.

The Reliability of the Test.—Though there does not appear to be a question of validity involved, there remains, however, a question

of reliability inasmuch as the instances of bowling here chosen for study represent merely a sample of the possible total number of first balls. It was found that the method of scoring using the first balls only, total of the best six, has very acceptable reliability coefficients (.93 to .96). However it was thought that the method of combining the three best with the three best scores might contain a superficial factor which would result in spuriously high coefficients of reliability. This possibility was checked by a recalculation in which a chance method of combining scores was used. The reliability coefficients thus obtained are much lower than the previous ones thus confirming the belief that the previously obtained correlations were spuriously high. The highest coefficients (.76) were obtained when the method of scoring in which the total of the best eight, first balls only, was used.

PROCEDURE

In order to compare groups which had instruction with the motion picture with those which did not have this medium as a regular part of their instructional program, it was necessary to set up procedures for teaching, measuring, and comparing results.

Procedures for Teaching.—The groups under observation in this experiment were typical of instructional groups. Both the experimental and control groups were composed of freshmen college women. Beginners only were used in this study; they were all required to take physical education and had elected bowling as the sport in which they desired to participate. The "control" and "experimental" groups were so designated after being selected at random.

The two instructors who participated in the experiment are experienced teachers and had had previous experience in using the instructional film. Each instructor taught two control and two experimental classes. Standard methods of instruction and learning conditions were maintained, the instructional procedure and conduct of all classes being identical insofar as this was possible. The discriminating factor was the addition of the film which was used only with the experimental groups. Each time the film was shown attention was directed to particular points. Not only was the film used in its entirety many times, but specific parts of the film were used for class and individual instruction each day. A constant effort was made to analyze and evaluate pupil performance in comparison with that depicted in the film.

Procedures for Measuring the Results.—Records were kept (1) of each ball rolled by each student during every class period, (2) of the scores made per day as obtained by the usual method of scoring bowling, and (3) of dates on which film instruction was given. At

the same time the list of the individuals to whom this was given was noted and the nature of their instruction was recorded. In addition a record of all verbal instruction given to classes and to individuals in all groups and the dates of this instruction was kept.

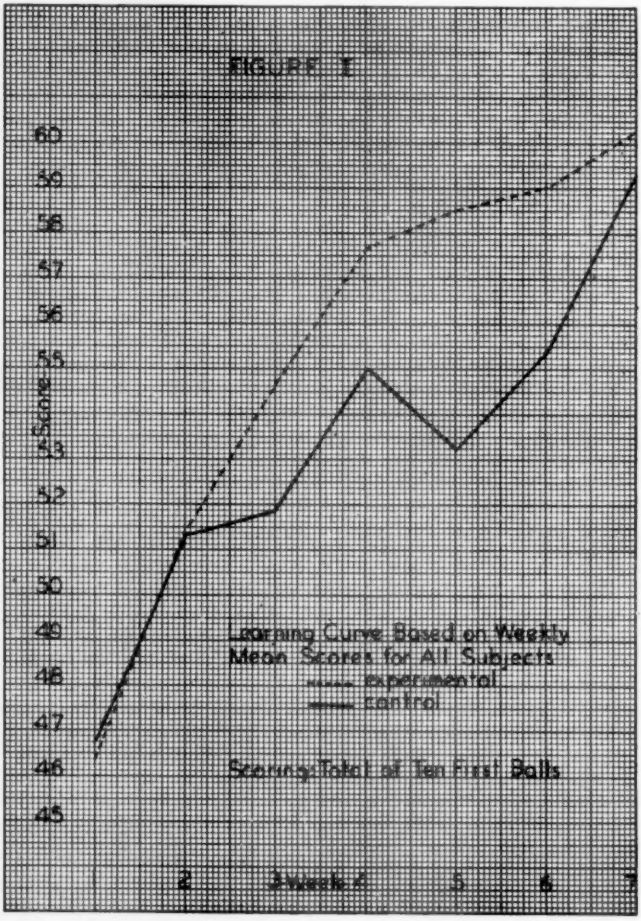


FIG. 1. Graph showing comparison between mean scores of control and experimental groups in bowling during seven weeks of instruction.

Procedures for Comparing Results.—The following scores were considered desirable for comparative purposes. Scores were therefore tabulated for (1) the total of all ten first balls only, (2) the total of the best nine of all ten first balls only, (3) the total of both balls. For the final study data were collected over a period of two seasons. The first season of seven weeks is referred to as Winter I, and

the second season of seven weeks is referred to as Winter II. The critical ratio technique was used as a measure of the significance of the difference between the means of the experimental and control groups. No attempt was made to equalize the groups since in each case there was no statistically significant difference between the initial scores. Learning curves of all classes by the three selected methods of measuring performance were graphed. (Since the trends in each instance are alike, Table I and Figure I only are included.

INTERPRETATION OF RESULTS

The graphs of learning and critical ratios which were obtained show that the film is valuable. Why was it of benefit? In any learning problem it is necessary to obtain an intellectual concept, a clear picture of just what is expected. The film seemed to assist in giving this concept for the movie groups grasped the nature of the desired response more quickly than did the non-movie groups. The film was planned by the instructors who used it and therefore contained the fundamentals of form which they wished to emphasize. Since the film contained precisely the material which was to be learned, and since the film could be shown at exactly the time it seemed needed, it probably did assist in providing the desired intellectual concept of the bowling skill.

Fundamental scientific evidence indicates that learning is a complex process and that there are many compensatory mechanisms which influence behavior. It is reasonable to believe, therefore, that there are too many possible avenues by which learning takes place for a single teaching device to make significant differences in terms of the totality. Realizing the complexity of the process of learning a motor skill, it is surprising to find that the motion picture as a single device did influence the results.

In answer to the question of where in the learning process the motion picture should be introduced, the general conclusions from other fields of learning indicate that it is of most value during the early stages of learning, decreasing in value as skill increases. In the present study the plotted learning curves and critical ratios indicate that learning in both groups was practically identical for the first two weeks. Possibly an explanation of this lies in the fact that there were so many existing possibilities for improvement; as the opportunities for improvement decreased the clearer intellectual concept obtained by the movie group assisted this group in averting plateaus. The evidence indicates that the motion picture was of most value not in the first stages, but after there had been some practice in the skill, since the difference in the improvement of the groups did not become evident until the third week. This may

TABLE I
CRITICAL RATIOS

(Based on mean scores of experimental and control groups computed for each week)

Week	Winter I: Movie, Non-Movie			Winter II: Movie, Non-Movie			Total: All Groups Movie, Non-Movie		
	First Balls Best 9	First Balls All 10	Both Balls Total	First Balls Best 9	First Balls All 10	Both Balls Total	First Balls Best 9	First Balls All 10	Both Balls Total
I	.70	.66	1.08	—.90*	—1.00	—1.03	—.11	—.20	—.28
II	.74	.67	.15	—1.19	1.00	—1.85	—.16	—.02	—.67
III	.49	.43	1.28	.72	2.03	1.15	1.22	1.47	1.88
IV	1.51	1.54	2.01	.85	.80	.31	1.47	1.33	1.06
V	3.33	3.34	1.96	.23	.18	.66	2.74	2.61	2.21
VI	1.45	1.09	.14	1.46	1.59	1.55	2.14	1.82	1.45
VII	1.68	1.37	.94	—.55	—.47	—.009	.43	.40	.68

* Minus indicates that the control group had the larger mean.

mean either that the motion picture was not of value, or that its particular advantages were not manifested until that time.

CONCLUSIONS

The motion picture in this study was found to be of definite value to those groups which had this device as a part of the regular instructional program. The following evidence substantiates this conclusion. These findings are based on a consideration of the total of all movie and non-movie groups as judged from the weekly mean values and as indicated in the critical ratios.

1. The rate of improvement in learning of the movie group was more consistent than that of the control.

2. During the first two weeks of instruction the performance in the two groups was practically identical. As shown by the critical ratios and slope of the curve during the third week, the experimental group continued its initial rapid rate of improvement whereas the control group remained at practically a standstill. A similar plateau of learning was shown by the control group in the fifth week while again the experimental group maintained its steady improvement.

3. There is strong evidence, as shown in the critical ratios of the fifth week, that the experimental group at this time was definitely superior to the control.

4. Although the movie and control classes started with practically the same mean score, at the end of the third week of instruction the movie classes surpassed the non-movie group and continued to be superior throughout the remaining periods of observation.

SELECTED REFERENCES

1. Adams, Thurston, *Motion Pictures in Physical Education* (New York: Bureau of Publications, Teachers College, Columbia University, 1939).

2. Dale, Edgar, Frannie W. Dunn, Charles F. Hoban, Jr., and Etta Schneider, *Motion Pictures in Education—A Summary of the Literature* (New York: H. W. Wilson Co., 1938).

3. Dear, Elaine M., Louise Kjellstrom, and Jenny E. Turnbull, *Motion Pictures in Sports,* National Section on Women's Athletics, 1939.

4. Glassow, Ruth B., and Marion R. Broer, *Measuring Achievement in Physical Education* (Philadelphia: W. B. Saunders Company, 1938).

5. Glassow, Ruth B., "Motion Pictures as Teaching Aids," *Journal of Health and Physical Education,* 13:8 (October, 1942).

6. Hoban, C. F., C. C. Hoban, Jr., and Samuel B. Zisman, *Visualizing the Curriculum* (New York: The Cordon Company, 1937).

7. Priebe, Roy E.., and William H. Burton, "The Slow Motion Picture as a Coaching Device," *School Review,* 47 (March, 1939).

8. Ruffa, Edward J., *An Experimental Study of Motion Pictures as Used in the Teaching of Certain Athletic Skills,* unpublished master's thesis, Leland Stanford University, April, 1936.

9. Webster, Randolph W., "Psychological and Pedagogical Factors Involved in Motor Skill Performance as Exemplified in Bowling," *Research Quarterly,* 11:10 (December, 1940).

What the Public Knows About Nutrition

By H. F. KILANDER,
Civilian Food Requirements Branch
War Food Administration, Washington, D. C.

TO WHAT extent is the public informed about the facts of nutrition? Does the average person know enough about foods, diets and nutrition to be able to plan his or her own daily food requirements whether the meals are eaten at home or in a public restaurant? Are American housewives sufficiently informed about comparative food values to be able to make the best use of their ration points and their food dollars? Is the public becoming more informed about nutrition? Is the extensive program in nutrition education having an effect that is measurable?

Answers to these questions would be very helpful in appraising needs and evaluating present programs in foods and nutrition education, and in planning new procedures aimed at raising the nutrition habits through education of the public.

Some light on the above questions is here presented. The findings and conclusions are based upon a study made in 1942 and 1943 of the nutrition information of over 5,000 individuals. A test[1] was used which consisted of 33 multiple choice questions representing the major phases of nutrition. Many of those tested were questioned individually about their responses to each question and their personal food habits.

The majority of the adults who took the nutrition test were high school graduates. About thirty per cent of the total were also college graduates. Thirty-five groups were examined including nine made up of college students and five of junior and senior high school students. About eighty-five per cent of the total number were women.

A comparison of the extent of the public's information on nutrition for 1942 with similar findings obtained in 1937 was possible as eight of the questions used in 1942 were originally included in a previous test in 1936-37.[2]

CONCLUSIONS AND RECOMMENDATIONS

1. The public is better informed on nutrition today than in 1937. The average score on the eight questions used in both tests was ap-

---

This study was begun in 1942 when the author was Dean at Panzer College, East Orange, N. J.

1 The Kilander Nutrition Information Test, 1942.

2 H. F. Kilander, "The Health Knowledge of High School and College Students," *Research Quarterly*, 8:3 (October, 1937), pp. 2-32.

proximately thirty per cent higher in 1942 than in 1937. This increase was not uniform for each of the various nutrition fields, it ranging from 2 to 103 per cent on the eight questions.

2. In the opinion of the writer, about half of those tested did not show themselves to be sufficiently informed about nutrition to be able to wisely select adequate diets for themselves. About seventy-five per cent are probably not sufficiently informed to be in the responsible position of planning meals for other people if these meals are to be well selected, economical, and chosen from foods available in wartime. Food rationing calls for a better informed food buyer.

3. Many people, including some of the more intelligent and better educated individuals, still hold many misconceptions about foods, some of these beliefs bordering on being superstitions. For example, many individuals, particularly women, have peculiar ideas about reducing.

4. In general, as would be expected, those people who are best informed are also the ones who are eating best, nutritionally speaking. Many of these individuals are able to do this at a lower cost than others who may be less informed but who are able to depend upon the more expensive foods for better nutrition. Numerous exceptions to this statement were noted, for many of the better informed individuals do not necessarily eat better by choice, whereas, fortunately, many of those who scored poorly are following the simple rules of good nutrition even if they do not understand the reasons behind these rules.

5. The best informed of the lay public on the subject of nutrition are in most instances those who actually have spent some time in studying the subject either out of a book or in a nutrition class. By contrast those individuals who listen to the radio or who read newspapers and advertising material for their food and nutrition information may be informed on certain specific topics such as vitamins, but these sources are not sufficient to give them a well rounded picture of what constitutes an adequate diet. However, these techniques as well as others all contribute to an informed public.

6. By groups, the ranking on nutrition information was found to be as follows: The best informed are, obviously, the nutritionists, dietitians, and home economists who usually scored 90 and occasionally 100. Rating very good are physicians and the better-informed homemakers, college graduates who have children. Dentists and nurses follow closely. Educators score fair to good. The average housewife scored good. College students were fair to good. Clerks, stenographers, unskilled laborers, and high school students scored poor to fair. There were many individual exceptions to the above-mentioned rankings.

7. It is evident that the public needs more scientific information on foods and nutrition presented in a simple and practical way, for it can be an important means of motivating the American public in improved food habits. All possible means should be used to supply this information. It is hoped that many people will avail themselves of opportunities to read about nutrition, listen to talks, and enroll in nutrition classes. Men were found to be interested in nutrition and should be given encouragement and the opportunity to learn more about their personal nutrition needs, especially those who eat out a great deal. The newer group of commercial food operators are insufficiently informed and should definitely be encouraged to include nutrition education in their preparation for their work.

8. It is recommended that every high school and college student be given at least a one-hour credit course in nutrition for one semester. For those individuals not in school, the twenty-hour Red Cross Nutrition Course is recommended.

AN ANALYSIS OF INDIVIDUAL QUESTIONS

The answers of the 5,000 individuals to some of the thirty-three questions are here analyzed. Comparisons are made with the findings obtained in 1937 on those questions which were used in both studies.

Vitamins

Sixty-four per cent of the 5,000 individuals who took the test checked correctly that rickets was associated with vitamin D rather than with any of the other three vitamins listed. In 1937 the percentage of correct responses was 58, a 17-per-cent increase.

That cooking decreased the value of vitamins rather than the other five food essentials listed was known by 83 per cent. In 1937 the number who answered this question correctly was 52 per cent, a 40-per-cent increase.

That a deficiency in vitamin A is a cause of night blindness was known by 75 per cent. Another 11 per cent checked vitamin G, giving a total of 86 per cent who knew that it was a vitamin which was involved rather than one of the other answers, iodine, iron, or protein.

Seventy-six per cent checked correctly that the tomato is a good substitute for orange juice. Another 20 per cent thought the answer was cod liver oil. These individuals probably knew that a vitamin was involved, but they were not sufficiently informed to know that both tomatoes and oranges are rich in vitamin C whereas cod liver oil is an excellent source of vitamins A and D.

Minerals

That iron is needed by the red corpuscles to help carry oxygen was known by 84 per cent. The remaining answers were scattered among calcium, copper, and phosphorous. In one sophomore high school class, 26 per cent checked phosphorus.

Practically everyone, 98 per cent, knew that, in addition to phosphorus, the mineral calcium is needed to build strong teeth rather than iron, copper, or iodine. This question ranked first in correct responses on the entire test. Over half of the 35 groups tested had perfect scores. The lowest average score was 88, made by a high school freshman class.

Yet, when we realize that calcium deficiency is prevalent in the states where this survey was made in spite of an abundant milk supply, it is evident that factual information is not sufficient to insure an adequate diet. Other factors are also involved.

Weight Control and Calories

Seventy-two per cent indicated correctly that occupation, rather than climate, sex, or individual difference, was the most important single factor in determining the number of calories needed by an adult. Another 20 per cent checked individual differences. The occupation of an individual usually represents the amount of physical activity performed for a major part of the day.

That eating too much high-calorie food is the reason why most people are overweight was known by 64 per cent. Twenty per cent thought the answer was an underactive gland; twelve per cent considered too little exercise to be the cause; and three per cent indicated that it was due to an inherited tendency. All of these three other answers are involved to some extent, but most obese people simply eat too much. College students were more likely to consider insufficient exercise as the most important factor whereas 40 per cent of the high school students tested thought that the thyroid gland was the cause. Many overweight adults who took the test knew that eating too much was the most important factor, thereby furnishing a good example of information not put into practice.

Only 52 per cent knew that a glass of whole milk (160 calories) had the highest fattening value of the four foods listed. Thirty-five per cent checked a medium-sized potato (100 calories), ten per cent checked an average slice of bread without butter (65 calories), and three per cent thought the correct answer was a medium-sized head of lettuce (48 calories). All high school classes who took the test scored average or better on this question although they ranked low on the total test score, probably another illustration of teaching stress on the subject of milk. Sixty-one per cent of one college nutrition class considered the potato more fattening than milk. In 1937, 51 per cent answered the question correctly, indicating practically no improvement on this subject by 1942. Many of the women who did not know that milk had the highest calorie value, made comments such as: "Oh, I'm not drinking any more milk if it will make me put on more weight." They were informed of the other valuable nutrients which milk supplies and that milk (not necessarily whole milk but skimmed milk or buttermilk) therefore is so important for everybody that it should even be a "must" for those who are reducing.

Eighty-one per cent knew that coffee without cream but with sugar contains only calories. Three per cent checked vitamins, seven per cent, protein, the remainder, some other answer. Most adults were correctly informed on this question. It is the high school and college students who are misinformed. Only one-third of the members of one high school freshman class answered the question correctly.

That many people still believe that water has something to do with one's weight is born out by the following figures. Only seventy-six per cent correctly checked "none" to the question, "A glass of drinking water contains approximately how many calories?" Eleven per cent thought the answer was 50 calories; six per cent checked 100, four per cent indicated 200, while three per cent did not attempt to answer the question. Women, especially the younger ones, were more likely to have this question incorrectly answered.

Bread, Cereals, and Carbohydrates

Seventy-seven per cent indicated correctly that whole wheat bread is richer than white bread in all except starch. The remaining answers were about equally divided between roughage, minerals, vitamins, and protein. The lowest group score was 48, made by a high school freshman class. It would be of interest to explore the other factors which are holding back greater consumption of whole grain bread considering that three out of four got this answer right, and yet only seven per cent of the bread sold is whole grain. Also, to what extent will the enrichment of white flour further contribute to a continuation of this small consumption of whole grain bread?

That it was thiamin, nicotinic acid, and iron which is added to white flour in order to enrich it, was answered correctly by 41 per cent. Another 40 per cent checked calcium, vitamin C, and wheat germ; 13 per cent thought it was milk, butter, or eggs; and three per cent checked protein, roughage, and fat. This question ranked lowest on the entire test. However, most adult groups averaged above the 41 per cent. High school students were least informed and brought the general average down. Most of the 5,000 individuals who took the test, answered this question in 1942 when the term "enriched" was relatively new. Probably a much higher percentage would answer the question correctly today. This question gives a fairly definite indication of the effect of an educational program aimed at a specific food product.

That butter is the one food which does not contain carbohydrates was answered correctly by seventy per cent. The remaining thirty per cent checked one of the other foods which are all carbohydrates—cake, crackers, cookies, candy, and macaroni. The answers given to this question and to similar ones used in other surveys, indicate that the public is not very well informed on the simple, chemical makeup of foods.

Eighty-three per cent knew that the function of carbohydrates is to supply heat and energy. This figure is an improvement over the 65 per cent who answered the question correctly in 1937. Twelve per cent thought the function was to yield energy and build tissue. Several of those who had marked the question in this manner, when discussing the question with the writer, added that, in the process of getting stout from carbohydrates, fatty tissue was built. They were correct in this view, but it is not the usual meaning given to the phrase, "build tissue."

Milk

Ninety-seven per cent agreed that to use milk in cooked foods is the best thing to do if some member of the family does not drink milk. It would be interesting to know to what extent this practice is actually applied in families where this problem is present.

That it is safe to eat sea food and drink milk at the same meal is accepted by 55 per cent. Only 16 per cent of the high school students answered this question correctly. Most of those individuals who were questioned about their misinformation concerning sea food and milk admitted eating oyster stew made with milk. Another 34 per cent had checked the statement that keeping food in open tin cans may cause food poisoning. In one high school junior class, 76 per cent checked this latter question, whereas only eight per cent marked the correct answer about sea food and milk. Many thought both of these questions correct and found it difficult to decide which one to check. The remaining 11 per cent checked two other statements incorrectly.

Eighty-five per cent knew that milk, although one of our best foods, is low in iron and lacks roughage. The incorrect replies were equally distributed among proteins, fats, carbohydrates, and vitamins. Adult groups were gen-

erally well informed whereas high school groups were not. In 1937 seventy-five per cent of those tested answered this question correctly.

Sixty-seven per cent answered correctly that canned evaporated milk, mixed with equal parts of water is as good for you as fresh, pasteurized whole milk. Another 17 per cent thought the answer was skimmed milk; 13 per cent checked condensed milk, and one per cent answered sour milk. One group of women scored 100 per cent on this question while one college freshman class scored only 22 per cent correct, most of whom thought it had the value of skimmed milk. The high school students averaged 67 per cent correct.

General Nutrition Information

Seventy-two per cent in 1943 as compared with 65 per cent in 1937 answered correctly that the period from birth to 6 years is the one in which lack of proper food results in most harm. Another 14 per cent thought it was childhood—from 6-12 years; 13 per cent checked adolescence, and one per cent checked early maturity. A parent-teacher group had the highest average score with 91 per cent correct.

That hookworm is not a food deficiency disease as compared with scurvy, pellagra, or beriberi was correctly checked by 90 per cent. Scurvy was checked the fewest times of the incorrect answers, possibly an indication that the public has heard that term more often than the other two and therefore knew it to be a deficiency disease.

Ninety per cent answered correctly that, normally, constipation is best avoided through the use of foods containing roughage. Five per cent checked laxatives, three per cent said mineral oil, and one per cent stated yeast. One-third of all the 35 groups answered this question 100 per cent correctly. Here also it would be interesting to know what percentage of those individuals who answered the question correctly, still depend upon the drugstore for laxatives, cathartics, and mineral oils.

In answer to the question, which food is a good substitute for meat as a source of protein, 82 per cent checked correctly that it was cheese. That the public is better informed about meat substitutes and alternates might be concluded as only 51 per cent answered this same question correctly in 1937, an increase of 61 per cent in correct responses. One-third of the groups scored 100 per cent on this question. The incorrect answers were distributed among vegetable broth, spinach, rice, and bread.

THE NUTRITION INFORMATION TEST WITH CORRECT ANSWERS AND ANALYSES

	Per Cent
1. During which age period will lack of proper food result in most harm?	
*1. From birth to 6 years	72
2. Childhood, 6-12 years	14
3. Adolescence, 12-18 years	13
4. Early maturity, 18-24 years	1
(Rank 19, Range** 50-91)	
2. If candy is to be eaten, the best time is:	
1. Between meals	3
2. Just before meals	2
*3. At end of a meal	95
4. At bedtime	x†
(Rank 3, Range 76-100)	
3. Which one of these diseases is not a food-deficiency disease?	
1. Scurvy	2
2. Pellagra	4

* Starred items are correct answers.
** Range is poorest and best of the 35 group averages.
† Less than .5 per cent.

	Per Cent
*3. Hookworm	90
4. Beriberi	3
Unanswered	1
(Rank 6, Range 68-100)	
4. The most important single factor determining the number of calories needed by an adult is:	
1. Climate	4
*2. Occupation	72
3. Sex	4
4. Individual differences	20
(Rank 18, Range 44-93)	
5. If some members of your family do not like to drink milk, the best thing to do is:	
1. Force them to drink it	x
*2. Use milk in cooked food	97
3. Substitute other drinks such as tea or coffee	0
4. Make sure that they drink a lot of water	2
Unanswered	x
(Rank 2, Range 90-100)	
6. Which other mineral in addition to phosphorus is needed to build strong teeth?	
1. Iron	2
2. Copper	0
*3. Calcium	98
4. Iodine	0
(Rank 1, Range 88-100)	
7. Which *one* statement is true?	
1. Proteins and carbohydrates should not be eaten at the same meal	5
*2. It is safe to eat sea food and drink milk at the same meal	55
3. Eating whole wheat bread is a means of reducing weight	5
4. Keeping food in open tin cans may cause food poisoning	34
Unanswered	1
(Rank 28, Range 12-100)	
8. In order to provide your family, at no extra expense, with important vitamins, which one of the following would you buy?	
1. Frozen foods	11
*2. Enriched bread and flour	71
3. T-bone steak or pork chops	5
4. Cellophane-wrapped foods	13
(Rank 20, Range 40-100)	
9. The red corpuscles in the blood need which mineral to help in carrying oxygen?	
*1. Iron	84
2. Calcium	4
3. Copper	1
4. Phosphorus	8
Unanswered	3
(Rank 10, Range 52-100)	
10. Milk is one of our best foods; yet it is low in iron and lacks which one of the following?	
1. Proteins	3
2. Fats	2
3. Carbohydrates	7
*4. Roughage	85
5. Vitamins	1
Unanswered	2
(Rank 8, Range 48-100)	
11. The cooking of food decreases the value of:	
1. Proteins	3
2. Starch	1
*3. Vitamins	83
4. Calories	3
5. Fats	1
6. Minerals	8
Unanswered	1
(Rank 9, Range 56-100)	
12. A glass of drinking water contains approximately how many calories?	
*1. None	76
2. 50	11
3. 100	6
4. 200	4
Unanswered	3
(Rank 15, Range 36-100)	
13. Which of the following foods is a good substitute for orange juice?	
*1. Tomatoes	76
2. Beef	1
3. Cod liver oil	20
4. Whole wheat bread	2
Unanswered	1
(Rank 16, Range 48-97)	
14. Normally, constipation is best avoided through the use of:	
1. Mineral oil	3
2. Yeast	1
3. Laxatives	5
*4. Foods containing roughage	90

	Per Cent
Unanswered	1
(Rank 5, Range 73-100)	
15. Three of the following rules are good guides in planning the diet. Which *one* is *not*?	
1. Eat two servings of fresh, raw fruits or vegetables daily	1
2. Drink one quart of milk daily	2
3. Eat at least four eggs weekly	3
*4. Spend at least 40% of food budget on cereals and fats	94
(Rank 4, Range 82-100)	
16. Cooking vegetables with soda reduces the value of:	
1. Minerals	22
*2. Vitamins	64
3. Roughage	6
4. Calories	6
Unanswered	2
(Rank 26, Range 28-91)	
17. Which vitamin is needed by children in order to prevent rickets?	
1. A	3
2. B	12
3. C	14
*4. D	68
Unanswered	3
(Rank 23, Range 34-100)	
18. Which food is a good substitute for meat as a source of protein?	
1. Vegetable broth	6
2. Spinach	4
3. Rice	5
4. Bread	2
*5. Cheese	82
Unanswered	1
(Rank 12, Range 50-100)	
19. In cooking or storing of food, which vitamin is destroyed?	
1. A	19
2. B	12
*3. C	56
4. D	8
Unanswered	5
(Rank 27, Range 28-100)	
20. Most people who are overweight are so because:	
*1. They eat too much high-calorie food	64
2. They exercise too little	12
3. They have inherited the tendency	3
4. They have an under-active thyroid gland	20
Unanswered	1
(Rank 25, Range 24-94)	
21. Whole wheat bread is richer than white bread in all except which one item?	
*1. Starch	77
2. Roughage	7
3. Minerals	4
4. Vitamins	4
5. Proteins	6
Unanswered	2
(Rank 14, Range 48-100)	
22. Nicotinic acid is:	
1. A drug	20
2. A mineral	9
*3. A vitamin	45
4. An amino acid	21
Unanswered	5
(Rank 31, Range 8-92)	
23. A deficiency of which food essential is a cause of night blindness?	
1. Iodine	5
2. Iron	3
3. Protein	3
*4. Vitamin A	75
5. Vitamin G	11
Unanswered	3
(Rank 17, Range 44-100)	
24. Which food in the indicated amounts has the highest calorie value (fattening value)?	
1. A medium-sized potato	35
2. An average slice of bread without butter	10
3. A medium-sized head of lettuce	1
*4. A glass of whole milk	52
Unanswered	6
(Rank 30, Range 27-86)	
25. Approximately how many calories does the average high school boy need daily?	
1. 1000-2000	2
2. 2000-3000	34
*3. 3000-4000	54
4. 4000-5000	4
Unanswered	6

	Per Cent
(Rank 29, Range 28-76)	
26. The basal metabolism at the age of 14 as compared with that at the age of 40 is:	
*1. Higher	71
2. The same	5
3. Lower	12
4. It is not definitely known	7
Unanswered	5
(Rank 21, Range 52-92)	
27. A cup of coffee with sugar but without cream contains only:	
1. Vitamin B	3
*2. Calories	81
3. Protein	7
4. Roughage	4
5. Calcium	3
Unanswered	2
(Rank 13, Range 36-100)	
28. The dietary standard for protein expressed in grams needed per day for a person of 150 pounds is about:	
1. 30	7
*2. 75	44
3. 150	27
4. 300	7
Unanswered	15
(Rank 32, Range 20-77)	
29. The term "enriched" when applied to bread as sold by baking companies means bread made out of white flour to which has been added:	
1. Milk, butter or eggs	13
*2. Thiamin, nicotinic acid and iron	42
3. Protein, roughage and fat	3
4. Calcium, Vitamin C, and wheat germ	40
Unanswered	2
(Rank 33, Range 16-82)	
30. Which one statement is false?	
1. Most leafy vegetables are rich in vitamins and minerals	1
2. There is no harm in drinking orange juice and milk at the same meal	5
3. Drinking over six glasses of water daily is not fattening	4
*4. Some bath powders are capable of reducing one's weight	89
Unanswered	1
(Rank 7, Range 64-100)	
31. Which one food does not contain carbohydrates?	
1. Cake	1
2. Crackers	13
3. Cookies	x
4. Candy	2
*5. Butter	70
6. Macaroni	12
Unanswered	2
(Rank 22, Range 40-100)	
32. In which way are carbohydrates (sugars and starches) utilized by the body?	
*1. To supply heat and energy	83
2. To build and repair tissue	3
3. To regulate the body processes	2
4. To yield energy and build tissue	12
(Rank 11, Range 56-96)	
33. Canned evaporated milk, mixed with equal parts of water, is as good for you as:	
1. Sour milk	1
2. Skimmed milk	17
3. Condensed milk	13
*4. Fresh, pasteurized whole milk	67
Unanswered	2
(Rank 24, Range 22-100)	

A COMPARISON OF THE RESPONSES TO NUTRITION QUESTIONS AS ANSWERED IN 1942-43 AND IN 1937

	'42-'43	'37†
1. During which age period will lack of proper food result in most harm?		
*1. From birth to 6 years	72	65
2. Childhood, 6-12 years	14	14
3. Adolescence, 12-18 years	13	17

† Percentage responses on questions in the nutrition test which had previously been included in a study made in 1937.

	'42-'43	1937
4. Early maturity, 18-24 years	1	2
Unanswered	0	2
10. Milk is one of our best foods. Yet it is low in iron and lacks which one of the following?		
1. Proteins	3	2
2. Fats	2	5
3. Carbohydrates	7	8
4. Roughage	85	81
5. Vitamins	1	2
Unanswered	2	2
11. The cooking of food decreases the value of:		
1. Proteins	3	20
2. Starch	1	6
*3. Vitamins	83	52
4. Calories	13	10
5. Fats	1	8
6. Minerals	8	0
Unanswered	1	4
17. Which vitamin is needed by children in order to prevent rickets?		
1. A	3	13
2. B	12	9
3. C	14	9
*4. D	68	58
Unanswered	3	11
18. Which food is a good substitute for meat as a source of protein?		
1. Vegetable broth	6	21
2. Spinach	4	15
3. Rice	5	8
4. Bread	2	3
*5. Cheese	82	51
Unanswered	1	2
24. Which food in the indicated amounts has the highest calorie value (fattening value)?		
1. A medium-sized potato	35	30
2. An average slice of bread without butter	10	11
3. A medium-sized head of lettuce	1	5
*4. A glass of whole milk	52	51
Unanswered	2	3
26. The basal metabolism at the age of 14 as compared with that at the age of 40 is:		
*1. Higher	71	45
2. The same	5	5
3. Lower	12	24
4. It is not definitely known	7	11
Unanswered	5	15
32. In which way are carbohydrates (sugars and starches(utilized by the body?		
*1. To supply heat and energy	83	65
2. To build and repair tissue	3	5
3. To regulate the body processes	2	7
4. To yield energy and build tissue	12	23

Research Abstracts

PREPARED BY THE
NATIONAL COUNCIL OF THE RESEARCH SECTION

HEALTH AND NUTRITION

Kallenberg, Dr. Henry F., "Narcotics and Physical Fitness," *Jour. P. E.* (P. E. Society of YMCA's of N.A.) v. 39, no. 4, Mar.-Apr. 1943.

A compilation of information secured by reviewing the literature in the field and presented under headings: tobacco poisons, basic effect of smoking, general effects, sources of information, comments and suggestions, attitude developed; considerations: in physical fitness programs, a national health problem, smoking and allergy, why smoking becomes a habit, what to expect of any poison, attempts to protect smokers, smoking and drinking, selling tobacco products; need for action.—*H. T. Friermood.*

Pijoan, Michel, and Carrie Ann Elkin, "Secondary Anemia Due to Prolonged and Exclusive Milk Feeding Among Shoshone Indian Infants," *J. Nutrition,* v. 27, no. 1, January, 1944.

An anemia, secondary in character, is found among Shoshone Indian infants and is due to the continued and exclusive use of milk in their dietary. Hemoglobin studies of the infants and iron determinations of their mother's milk were carried out. The average iron content of the Indian mother's milk was found to be 1.74 mg. Fe/liter compared to 2.3 mg. Fe/liter for normal white mother's milk. To obviate any possibility of the anemia being due to causes other than iron deficiency, a series of five infants was placed on a cow's milk formula which had an iron content of 2.4 mg. Fe/liter. There infants maintained their anemia, while another group, placed on a supplemental iron formula, showed an extraordinary increase in hemoglobin. A modification of Elvehjem's method of determining the iron content of milk is introduced.—*The Wistar Institute.*

Poling, Clyde Edward, Harold William Schultz, and Herbert Edwin Robinson, "The Retention of the Nutritive Quality of Beef and Pork Muscle Proteins During Dehydration, Canning, Roasting, and Frying," *J. Nutrition,* v. 27, no. 1, January, 1944.

Detailed individual growth and food consumption data were obtained for each meat product by the rat growth technique, using two levels of dietary protein, one considered adequate (10 to 15 per cent of the total calories) and the other suboptimal for rat growth. The meat proteins were made the limiting factor by eliminating other proteins as completely as possible from diets otherwise adequate and equivalent insofar as present knowledge permits. The canned pork, dehydrated pork, and dehydrated beef were all representative samples of commercial production prepared for the use of the armed forces and for export purposes. These biological evaluations indicate that the nutritive quality of the proteins of cured pork may be lowered to a small extent by a commercial canning procedure.

The results of a comparison of the protein quality of canned cured pork shoulder, roast fresh pork shoulder, fried fresh pork shoulder, dehydrated pork, and dehydrated beef placed dehydrated pork first, fried fresh pork shoulder second, and the remaining three of equal nutritive quality.

These differences in the nutritive quality of the various proteins were always small and were observed only at dietary protein levels suboptimal for maximum growth and not at practical and adequate protein levels.—*Wistar Institute.*

Tainter, Maurice Lane, "Actions of Benzedrine and Propadrine in the Control of Obesity," *J. Nutrition,* v. 27, no. 1, January, 1944.

The means by which benzedrine and propadrine may cause a loss of body weight in patients was investigated in white rats. Administration of the drugs orally or subcutaneously produced no changes in activity or oxygen consumption which would explain the antiobesity effects. Gastrointestinal motility was decreased, but this did not result in impaired digestion of the food. The drugs markedly decreased food intake, and the decreases in body weight could be accounted for by the deficits in caloric intake. Therefore, the primary effect of these drugs in reducing body weight appears to be exerted through a decreased appetite. Since tolerance to the effects on appetite develops rapidly, these drugs should be used only intermittently and as adjuvants to other established methods of treatment.—*The Wistar Institute.*

Deuel, Harry James, Jr., Eli Movitt, Lois Field Hallman, and Fred Mattson, with the technical assistance of Evelyn Brown, "Studies of the Comparative Nutritive Value of Fats," *J. Nutrition,* v. 27, no. 1, January, 1944.

No differences were noted in the growth rate of weanling rats fed on diets of mineralized, vitamin-fortified skimmed milk powder over 12-week periods irrespective of whether the fat was butter, or corn, cottonseed, olive, peanut or soy bean oil, or margarine. The extent of growth was confirmed at 3 and 6 weeks by x-ray determinations of tibia length. Also, the efficiencies of conversion of the diets containing the various fats to body tissue were identical. These experiments refute the idea that butter fat possesses certain saturated fatty acids, not present in other fats, which are essential for growth.—*Wistar Institute.*

Haldi, John, George Bachman, Charles Ensor, and Winfrey Wynn, "The Effects on Respiratory Metabolism Produced By Equal Amounts of Caffeine in the Form of Coffee, Tea, and the Pure Alkaloid," *J. Nutrition,* v. 27, no. 3, March, 1944.

A comparative study made of the gaseous exchange of two well trained subjects following the ingestion of 200 mg. caffeine alkaloid and of coffee and tea infusions containing this amount of caffeine showed that the effect of caffeine on oxygen consumption, carbon dioxide elimination, respiratory quotient, and respiratory ventilation was the same as that previously reported in this Journal. Coffee and tea had the same effect as the alkaloid. Comparison of these results with those obtained with decaffeinated coffee and decaffeinated coffee to which caffeine had been added shows that the effect of coffee and tea was due solely to their caffeine content. It may be concluded from these experiments that the rate of absorption and the action of caffeine in coffee and tea is the same as that of the pure alkaloid in solution.—*Wistar Institute.*

Kyhos, Emma Dowling, Edgar Stillwell Gordon, Marian Stark Kimble, and Elmer Louis Sevringhaus, "The Minimum Ascorbic Acid Need of Adults," *J. Nutrition,* v. 27, no. 3, March, 1944.

The initial findings of a 17 months' investigation into the vitamin C requirements of 71 male prisoners revealed that oral disease was prevalent regardless of age, and that the plasma ascorbic acid levels were under 0.2 mg. per cent in nearly 80 per cent of the subjects. Only a few men who supplied themselves with oranges or vitamin preparations had plasma values over 0.6 mg. per cent. The prison meals contained no fresh fruit and very few fresh vegetables.

Experimental supplementation with various doses of synthetic ascorbic acid showed the following results: 25 mg. daily, insignificant plasma level rise and slight improvement of gum disease; 50 mg. daily, noticeable rise in

plasma levels and improvement in gums during the summer and fall but the effects were not maintained throughout the winter and spring; 75 mg. daily, satisfactory rise in plasma to levels of 0.8 mg. per cent or above and healing of gums with maintenance of improvement throughout the year, in nearly all cases; 100 mg. daily, in a few subjects refractory to smaller doses gave a good response within 4 or 5 weeks. The probable minimal daily vitamin C requirement for the healthy male adult lies in the neighborhood of 75 mg. Some individuals refractory to this dose, in whom chronic infections of nose, throat, and gums are present, will respond to a higher dosage.—*Wistar Institute.*

Berryman, George Hugh, and Paul E. Howe, "A Short Method of Calculating the Nutritive Value of Diets, Concluded," *J. Nutrition*, v. 27, no. 3, March, 1944.

This article is a sequel to one on the same subject presented previously. The food pattern for the soldier from May, 1941, to April, 1942, and from November, 1942, to April, 1943, is presented, as well as tables of nutritive values for food groups based on the percentage use of individual foods. Both "summer" and "winter" values are presented. Reference is made to the earlier publication (Berryman and Chatfield, 1943) for the detailed background of these tables, and the degrees of accuracy made possible by their use.—*Wistar Institute.*

BIOLOGY AND PHYSIOLOGY

Howells, William White, "Physical Anthropology as a Technique," *Am. J. Phys. Anthrop.*, N. S. v. 1, no. 4, December, 1943.

This article is a discussion of the techniques which physical anthropology has evolved—measurement and statistical analysis—considered as constituting a special scientific method. In essence it is a means for discriminating between the physical form of human groups of any sort by the use of statistical controls which, as a method, is not to be confused with genetic analysis or the analysis of anatomical variation *per se*. The method has been used mainly in the study of race up to the present, but it is suggested that other fields, such as the study of population, present wider opportunities for its future study.—*Wistar Institute.*

Reynolds, Earle L., "Degree of Kinship and Pattern of Ossification. A Longitudinal X-Ray Study of the Appearance Pattern of Ossification Centers in Children of Different Kinship Groups," *Am. J. Phys. Anthrop.*, N. S. v. 1, no. 4, December, 1943.

Four kinship groups were selected from the Fels Research Institute series: identical twins (6 pairs); siblings (22 pairs); first cousins (8 pairs); unrelated children (9 pairs). X-rays of the left side of the body have been taken on these children at birth, 1, 3, 6, 9, and 12 months, and every six months thereafter. The onset of ossification for 38 centers, defined as the estimated time at which these centers became visible on the x-ray film, was determined for each center in each child. An attempt was made to determine whether the pattern of appearance of these 38 centers was more similar between related than between unrelated children; and in addition whether a differential existed among the three related groups. Pairs of more closely related children tend to have onset patterns that are more similar. Pairs of more closely related children tend to have deviant centers which are more similar in time of onset to their correspondng centers. Pairs of more closely related children tend to have sub-groups of ossification centers which are more similar in order of appearance. In each of these three characteristics, the ranking from greatest to least similarity is: twins, siblings, cousins, unrelated children. This

consistent hierarchy of resemblance points to some selective factor operating within the kinship groups. It is suggested that this selective factor is heredity operating upon both time and order of onset of ossification.—*Wistar Institute.*

Keys, Ancel, Austin Ferdinand Henschel, Olaf Mickelsen, Josef Maria Brozek, and James Harry Crawford, "Physiological and Biochemical Functions in Normal Young Men on a Diet Restricted in Riboflavin," *J. Nutrition,* v. 27, no. 2, February, 1944.

Controlled studies were made on six normal men subsisting on a diet restricted in riboflavin but otherwise adequate. The restricted regime was preceded by 3 control weeks and 12 restoration weeks. The restricted regime lasted 84 days for three men and 152 days for the other three men. The diet actually eaten was directly analyzed for riboflavin. It averaged 0.99 mg. per day (3150 ± 100 Cal.) or 0.31 mg. per 1,000 Cal. Exhaustive standardized tests and observations were periodically made. Besides ordinary and special clinical examinations these included tests of endurance, strength, psychomotor functions, and metabolism including intermediary details, in rest, work, and recovery. The 24-hour urinary excretion of riboflavin averaged 12 per cent of the intake and "saturation" tests gave very similar results. After the first few weeks there was no progressive change in the excretion or "saturation" tests. All of the clinical and functional results were essentially negative and constant. Corneal vascularity, cheilosis and skin abnormalities did not occur. Work performance and recovery and the bodily responses to work were unaffected by the dietary alterations. It is concluded that normal young men suffer no physiological handicap from subsistence for at least 5 months on a diet providing 0.31 mg. of riboflavin per 1,000 calories.—*Wistar Institute.*

Steinhaus, Arthur H, and Albert Kelso, "Improvement of Visual and Other Functions by Cold Hip Baths," *War Medicine,* vol. 4, pp. 610-617, Dec., 1943.

The authors found "distinct temporary improvement in certain visual functions, in tapping rate and in 'eye to leg muscle coordination' of human subjects following applications of a cold hip bath." Forty-seven male subjects 17-45 years of age were observed over 200 subject days with the bath and about as many days without the bath. Experimental procedure is explained in detail together with effects on visual efficiency, lateral muscle balance, perception of depth, critical fusion frequency, tapping rate, 1 and 2 movement reaction time, and other physiologic changes. No after-depression or "pay-off" period was observed. It is suggested that improvements produced by this bath merit its consideration and trial in those aspects of warfare and industry that involve monotonous routine duties demanding acute vision and alert performance.—*Aileen Carpenter.*

PHYSICAL EDUCATION

Wicks, Priscilla, "While You're Asleep," *Jour. P. E.* (P. E. Society of YMCA's of N.A.) v. 39, no. 3, Jan.-Feb., 1943.

A description of another experience in providing recreation and physical activity for swing-shift workers. An analysis of the problem, interpretation, and what happened to the people who participated in the resulting program. A method of attacking the problem that has wide applications.—*H. T. Friermood.*

Russell, Lynn, "Wartime Influence on YMCA Physical Education," *Jour. of P. Ed.* (P. Ed. Society of YMCA's of N.A.) v. 39, no. 3, Jan.-Feb., 1943.

A report of a survey of 2-3-4 man staffs to determine what effect the war

has had on their physical education programs after the first year of the war. It considered programs for boys and for men. New ideas were put into programs. Emphasis placed on: physical fitness, individual health service, leagues, young men's activities, swimming, servicemen. The type of sampling survey that should be made periodically to discover "trends" and current practices.—*H. T. Friermood.*

Jackson, C. O., and D. C. Keinlen, "The Training, Teaching Load, and Extra-Curriculur Duties of Men Teachers of Physical Education in Illinois," *The Physical Educator*, vol. 4, no. 2, January, 1944.

The information for this study was secured from 539 men teachers in 440 high schools in Illinois. Only 34 per cent of the teachers had majored in physical education while 22 per cent of the balance had a minor in this subject. The number of subjects taught by these instructors ranged from 1 to 9. Most of them carried a heavy load of teaching and coaching, having a range of 15 to 55 hours per week. Eighty-five per cent of the teachers who responded to questionnaires did not engage in any organized evening activity, but approximately 15 per cent did. Sixteen per cent of the men were responsible for noon hour recreation and 34 per cent handled intramurals. There appears to be little correlation between the adequacy of training and teaching load or the extra-curricular activities in which they engaged.—*C. Bookwalter.*

Scott, Walter L., "A Teen-Age Recreation Survey in Long Beach," *Recreation*, v. 37, no. 11, February, 1944.

A questionnaire was answered (under supervision of physical education teachers) by 3,340 junior and senior high school boys and girls at Long Beach, California. Omitted from the suggested activities list were commercial recreation activities, reading, and football. The list presented 38 activities, all but four of which were regularly supervised. Swimming led as the best-liked activity frequently engaged in by all groups. All but the senior high school girls listed it as an activity in which more knowledge and opportunity were desired. Swimming also led the list of hobby interests. The other activities leading the list of liked and in which there was frequent participation were: basketball, social dancing, baseball, camping, tennis, model aircraft, and volleyball.

As a result of the survey new activities in the Long Beach recreation program were started and are attracting enthusiastic and large groups of young people.—*C. Bookwalter.*

EDUCATION

Ludden, Wallace, "Anticipating Cases of Juvenile Delinquency," *School and Society*, v. 59, no. 1520, Sat., February 12, 1944.

The 345 delinquents were selected from court records of high school age youth in New York City. From alphabetized lists of seventh, eighth, and ninth-grade pupils 286 pupils were arbitrarily chosen for a control group. This made a total of 641 cases in the study.

Check lists were made out, data were summarized, and percentages were computed. Six elements of environment and eight elements related to school environment (over-age, subjects failed, etc.) were found to frequently accompany delinquency.

No obvious formula could be devised to segregate all those children who are likely to become delinquent. The study did show a definite though not exact relationship between delinquency and certain social, economic, and educational facts. The best method found for anticipating delinquency was found to be checking the 10 possible delinquent factors. This brought out the fact that the delinquents (69 per cent) scored 3 or more while the non-delinquents (26 per cent) did not score that high.—*C. Bookwalter.*

Bonney, Merl E., "Personality Traits of Socially Successful and Socially Unsuccessful Children," *The Journal of Educational Psychology*, Nov., 1943.

The author describes a most interesting study for which data were secured from children in three elementary schools who rated each other and who were rated by their teachers on the scale developed by Caroline M. Tryon. The scale included twenty traits such as: quiet, talkative, attention getting, bossy, tidy, fights, etc. Examples of the scale are given and methods used in securing and computing the data are described. Twenty-two pairs of "very mutual friends" are studied separately and then in comparison with thirty-seven pairs of very unreciprocated friends. From a detailed discussion of results the conclusions are drawn that "a child is well accepted in a group much more beause of what he is and what he does . . . than because of what he refrains from doing . . ."; that "popularity is not the superficial thing it is often assumed to be, but is rather tied up with the most basic traits of personality and character"; and that "the socially strong child is generally attracted to others who are likewise socially strong."—*Aileen Carpenter.*

Life and Honorary Members

American Association for Health, Physical Education, and Recreation

Ainsworth, Dorothy, 15 Barrett Place, Northampton, Mass.

Anderson, Lt. Jackson M., Special Service Officer, A.A.B., Dalhart, Texas.

*Anderson, W. G., Box 1911, Yale Station, New Haven, Connecticut.

Bell, Margaret, University of Michigan, Ann Arbor, Michigan.

Bookwalter, Karl W., Indiana University, Bloomington.

Booth, Minnie Anne, 135 Navarre St., Rochester, N. Y.

*Day, William E., 1377 Princeton Ave., Salt Lake City, Utah.

Delta Theta Epsilon, University of Illinois, Urbana, Illinois.

Di Giovanna, Vincent, Southern Illinois Normal University, Carbondale, Ill.

Dupain, George Z., Rose Bank, 158 Parramatta Road, Ashfield, N.S.W., Australia.

Elliott, E. S., Columbia University, New York City.

Friermood, Harold T., Y.M.C.A., 347 Madison Ave., New York City.

Fulton, Ruth E., 1230 Amsterdam Ave., New York City.

Gates, Grover, 835 Hampton Way, Fresno, California.

Giauque, Lt. Comdr. C. D., Sampson, N. Y.

Hansma, Lt. Jack, 9th Technical School Squadron, Fort Logan, Colo.

Hill, Laurence S., Ithaca College, Ithaca, N. Y.

Houston, Ruth, State Teachers College, Buffalo, New York.

Howe, Arthur L., Hamburg, New York.

Knoff, Daniel H., Ada, Minn.

Langton, Clair V., Oregon State Agricultural College, Corvallis, Oregon.

Lee, Mabel, University of Nebraska, Lincoln, Nebraska.

Luehring, F. W., 435 Riverview Rd., Swarthmore, Pa.

Mackey, Anne D., 33-30 211 Street, Bayside, L. I., N. Y.

McCloy, C. H., State University of Iowa, Iowa City.

*McCurdy, Mrs. Persis B., 79 Lawn Ave., Middletown, Conn.

McKinstry, Helen, Russell Sage College, Troy, New York.

Metcalf, T. N., University of Chicago, Ill.

Miller, Ben W., 1201 16th St., Washington, D. C.

Mitchell, Lt. Comdr. E. D., New Orleans, La.

Moore, Rodgers, 1859 26th, San Francisco, Calif.

Moorhead, W. G., 121 Center Street, East Stroudsburg, Pa.

Moulton, Gertrude E., 291 Forest Ave., Oberlin, Ohio.

Neilson, N. P., University of Utah, Salt Lake City.

Norris, J. Anna, 1429 East River Road, Minneapolis, Minn.

Noyes, Elizabeth, ARC, A.P.O. 921, c/o Postmaster, San Francisco, Calif.

Panzer College of Physical Education and Hygiene, 139 Glenwood Ave., East Orange, N. J.

Posse, Baroness Rose, Shelton Hotel, Lexington Ave. at 48th St., New York City.

Rugen, Mabel, University of Michigan, Ann Arbor.

Schnell, H. W., University of North Carolina, Chapel Hill.

Siler, J. Granville, 2574 Hilgard Avenue, Berkeley, Calif.

Sparks, Lestle J., Willamette University, Salem, Oregon.

Stafford, Grace M., N.Y.A., 611 Arlington Place, Chicago, Ill.

*Stecher, William A., 1510 Darby Road, Upper Darby, Pennsylvania.

Steinhaus, Arthur H, U. S. Office of Education, Washington, D. C.

Streit, William K., Board of Education, Cincinnati, Ohio.

Swain, Leslie E., Brown University, Providence, Rhode Island.

Tarr, Edna V., 606 Logan St., Toronto, Ontario, Canada.

Walker, Charles L., c/o R. L. Walker, 408½ S. Queen St., Lancaster, Pa.

---

*Honorary Members

AMERICAN ASSOCIATION FOR HEALTH, PHYSICAL EDUCATION, AND RECREATION

Board of Directors

President, Willim L. Hughes, Teachers College, Columbia University
President-Elect, Helen Manley, Public Schools, University City, Mo.
Past-President, A. H. Pritzlaff, Board of Education, Chicago
Vice-President (Health Education) Dorothy Nyswander, Office of Coordinator of Inter-American Affairs, Washington, D. C.
Vice-President (Physical Education) Harry A. Scott, Brooklyn College, Brooklyn, N. Y.
Vice-President (Recreation) Carl L. Nordly, University of Minnesota, Minneapolis
Exec. Sec.-Treas., Ben W. Miller, 1201 16th St., NW., Washington 6, D. C.

District Association Presidents

Central: Germaine Guiot
Eastern: George Ayars
Midwest: Robert Nohr, Jr.
Northwest: Lestle Sparks
Southwest: O. K. Cornwell
Southwest: Glen Worthington

Additional Members of Representative Assembly

Administration and Supervision: Alfred Anderson
Alabama: William R. Battle, Jr.
Amer. Acad. of P. E.: Arthur Steinhaus
Amer. Physiother. Assn.: Ellen Kelly
Amer. School Health Assn.: C. H. Keene
Arizona: Catherine A. Wilkinson
Arkansas: Ivan Grove
Boys Clubs of America, Inc.: Walter M. Hall
California: C. L. Glenn, Louise Cobb, Eleanor Metheny, Verne Landreth
Camping and Outing: Ross Allen
Canadian P. E. Assn.: A. S. Lamb
College and University Physical Education for Men: Glenn Howard
College and University P. E. for Women: Laura Huelster
College P. E. Assn.: O. K. Cornwell
College Recreation: Harriett Aull
Colorado: Granville Johnson
Conn.: Herbert Walker, Marjorie Zang
Dance: Ruth Bloomer
Delaware: G. W. Ayars
Delta Psi Kappa: Margaret McCall
Dental Health: Randolph G. Bishop
District of Columbia: Isabel Chappell
First Aid and Safety Education: Irma Gene Nevins
Florida: Katherine Montgomery
Georgia: Thomas McDonough, Gertrude Manchester
Health Instruction: Rosemary Kent
Idaho: (None)
Illinois: Iris Boulton, C. O. Jackson, Nellie Cochran, Bessie Specht
Indiana: Clara Hester, Reuben D. Behlmer
Industrial Recreation: John Ernst
Institutional Recreation: (To be appointed)
Intramural Athletics: Milton R. Howard
Iowa: Jane E. Harris, D. A. Armbruster
Kansas: Edna McCullough, Oran Shearer
Kentucky: Mary May Wyman
Louisiana: Frank J. Beier, Jess W. Hair
Maine: Louis Hutto
Maryland: Louis R. Burnett
Massachusetts: Ruth Evans, Nelson Walke
Men's Athletics: Everett S. Dean
Mental Health: Alfred Kamm
Measurement and Evaluation: Eleanor Metheny
Michigan: Margaret Bell, Vaughn Blanchard
Minnesota: Harold K. Jack, Glen Calligan
Mississippi: John J. Read
Missouri: Helen Manley, Ruth Ann Frazier
Montana: (None)
Municipal Recreation: (To be appointed)
National Association of P. E. for College Women: Elizabeth Halsey
National Col. Ath. Assn.: F. W. Luehring
Nebraska: Mabel Lee
Nevada: (None)
New Hampshire: Maurice O'Leary
New Jersey: Arthur Morr, Martha Lahey
New Mexico: Jere K. Reid
New York: Ellis Champlin, H. Harrison Clarke, Elmon Vernier, Ethel T. Kloberg
North Carolina: Julia Grout
North Dakota: Louise Reishus
Ohio: Delbert Oberteuffer, John Van Why, Paul Landis
Oklahoma: Valerie Colvin
Oregon: Lestle Sparks
Park Recreation: Milo P. Christiansen
Pennsylvania: C. Lawrence Walsh, Lloyd M. Jones, G. W. Mueller
Phi Delta Pi: Bernice Moss
Phi Epsilon Kappa: Wilbur DeTurk
Private Recreation: Harold L. Kistler
Private School P. E.: T. John Johnson
Professional and Public Relationships: Jessie R. Garrison
Professional Education: Mabel Rugen
Public School Physical Education: Joseph Burns
Research: Karl W. Bookwalter
Rhode Island: Bessie H. Rudd
School Nursing: Mildred Coyle
School Nutrition: Melva Bakkie
School Physicians: Charles C. Wilson
School Recreation: Carl A. Troester
Society of State Directors: Frank S. Stafford
South Carolina: Alice Dent
South Dakota: (None)
Student: Lucille Brahms
Tennessee: Bernice Iddins
Texas: P. C. Cobb, Harry A. Scott
Therapeutics: Mrs. Ivalclare S. Howland
Utah: Leona Holbrook
Vermont: Alice C. Aldrich
Virginia: Martha Barksdale, C. V. Graves
Washington: G. Spencer Reeves, Edwin A. Graham
West Virginia: Randolph Webster
Wisconsin: William C. Pickett, Jane E. Whitney
Women's Athletics: Anna Espenschade
Wyoming: (None)
Y.M.C.A. Phys. Dirs. Society: R. E. Laveaga
Y.W.C.A. Health Education Directors Society: Edith M. Gates

REPRINTS

from past issues of the *Research Quarterly*

10c each

Q 294 Effects of Competitive Basketball on Physical Fitness. *Olds.*

Q 296 Scholastic Attainment of Letter Winners. *Tuttle & Beebee.*

Q 297 Respiratory Habits of Trained Swimmers During Starts. *Morehouse.*

Q 298 College Hygiene Courses. *Montgomery.*

Q 299 Evaluating Team and Individual Performance in Basketball. *Elbel & Allen.*

Q 300 Factor Analysis of Motor Ability Variables and Tests. *Larson.*

Q 301 Anthropometry of Young Women. *Bell, Beise, & Hughes.*

Q 302 Measurement of Postures. *Buhl & Morrill.*

Q 303 Relation Between Phases of Kinesthesis & Performance. *Phillipps.*

Q 304 Qualities Used By Administrators in Judging Teachers. *Graybeal.*

Q 305 Survey of Safety Conditions of School Buildings and Grounds. *Irwin & Stephens.*

Q 306 Yale Freshmen Becoming Younger, Heavier, Taller. *Deegan.*

Q 307 Anthropometric Study of Masculinity & Femininity. *Carpenter.*

Q 308 Study of City College Physical Proficiency Test. *Ehrlich.*

Q 309 A Study of the Post-Exercise Heart Rate. *Morehouse & Tuttle.*

Q 310 Motor Educability Tests for Women College Students. *Hatlestad.*

Q 311 Common Postural Defects of College Freshmen. *Wickens & Kiphuth.*

Q 312 An Evaluation of a High School Tuberculosis Education Program. *Ross & Kinnaman.*

Q 313 A Study of the Relationship that Exists between Skill as Measured, and the General Intelligence of College Students. *Johnson.*

Q 314 Opthalmic Scoliosis. *Thompson.*

Q 318 An Evaluation of the Physical Status of City College Students on the Basis of Two Standardized Tests. *Ehrlich & Sperling.*

Q 320 Athletes as Blood Donors. *Karpovich & Millman.*

Q 321 Physical Education as a Profession. *Committee Report.*

Q 322 Activities Engaged in by Teachers of Physical Education in the High Schools of Illinois. *Jackson.*

Q 325 Body Measurements on 100 Negro Males from Tuskegee Institute. *Steggerda & Petty.*

Q 326 Health Material in a Representative Newspaper. *Novak.*

Q 328 The Brace Scale Used with Young Children. *Vickers, Poyntz & Baum.*

Q 329 Motor Fitness Tests for Farm Boys. *Hall.*

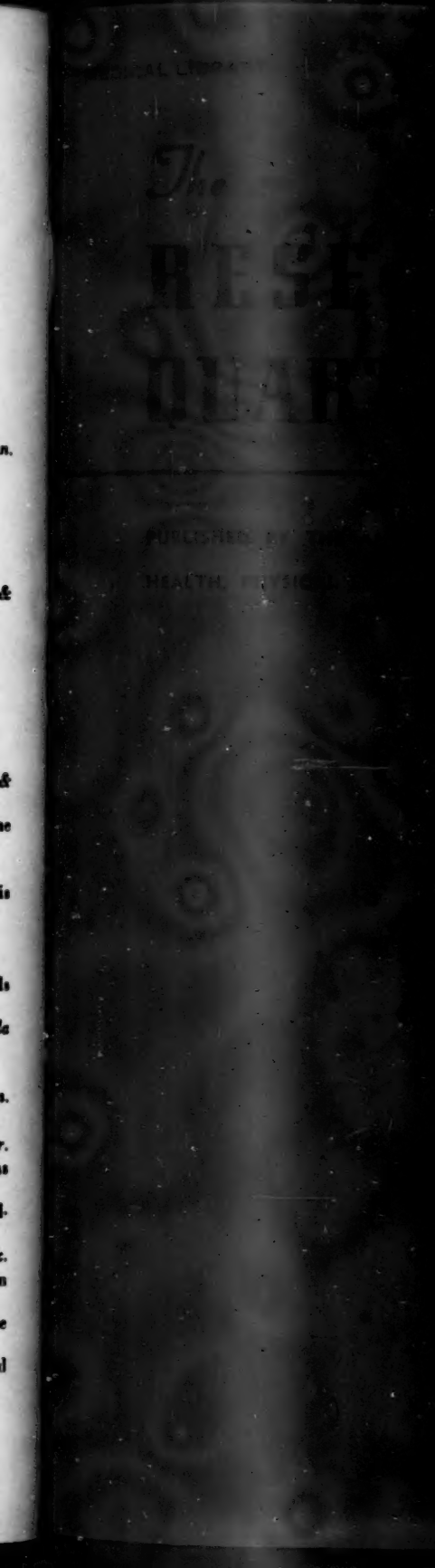
Q 330 The Importance of Providing Cumulative Sick Leave for Teachers. *Weber.*

Q 331 A Study of Accuracy of Direction in Motor Skills at Different Distances as Determined by the Relative Size of the Angle of Error. *Moffett.*

Q 332 Report and Recommendations of the National Committee on Aquatic Leadership. *Cureton.*

Q 333 The Harvard Summer School of Physical Education, 1887-1932. *Van Wyck.*

Q 334 Action Current Study of the Rectus Abdominalis as a Postural Muscle in Arm Movements. *Slater-Hammel.*

Q 339 Relation of Selected Structural and Functional Measures to Success in College Athletics. *DiGiovanna.*

Q 341 Improvement in Motor Fitness Associated with Physical Education and Physical Fitness Clinic Work. *Cureton.*